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WIRING OF BUILDINGS
FOR
TELEPHONE SERVICE

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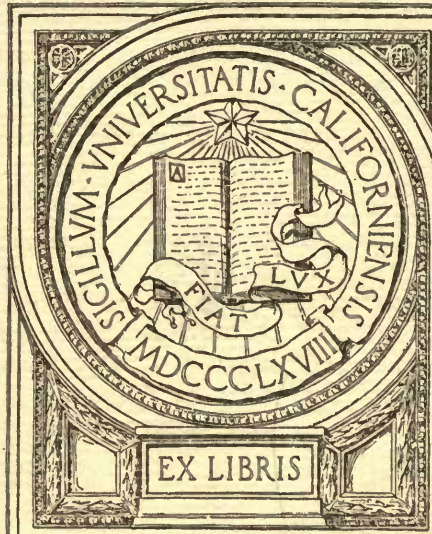
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WIRING OF BUILDINGS FOR TELEPHONE SERVICE

HANDBOOK

—OF—

THE PACIFIC TELEPHONE AND TELEGRAPH COMPANY

FOR THE

GUIDANCE OF ARCHITECTS AND BUILDERS

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PREFACE

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The problem of telephone distribution in large office and apartment buildings has grown to an importance that demands the attention of architects and builders. Provision should be made in all such modern buildings for telephone service and the same consideration should be given it as for gas, water, or electric facilities. In order to conceal unsightly telephone wires and cables, and avoid unnecessary cutting of walls and floors, provision should be made for these wires and cables during the construction of the building. The Pacific Telephone and Telegraph Company issues this handbook to bring about a uniformity in practice and to secure the economical and proper distribution of telephone wires and cables in buildings, and will gladly assist any architect, builder or owner in laying out the telephone facilities for a building of any size in its territory.

THE PACIFIC TELEPHONE AND TELEGRAPH CO.

San Francisco, Cal., April 1, 1912.

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SPECIFICATIONS FOR WIRING OF BUILDINGS

1. These specifications govern the choice of materials and the proper methods to be employed in the installation of telephone facilities in all new and remodeled buildings.

2. Telephone distribution in a building involves the running of three or more wires from each telephone to a central point near the entrance of the telephone wires or cables. When a number of telephone wires follow a general direction they should be grouped in cables. When the telephone wires diverge over a large area, the number of wires in a group is so reduced that a distributing cable is not justified. In this case the riser cable is terminated in a cabinet and the line is continued to the subscriber station by means of three approved rubber covered, braided and twisted wires. Plate I illustrates a general wiring arrangement from the "central point" in the basement.

3. The basic principle involved in the design of the telephone facilities for a building is simply to provide shafts, conduits, and mouldings wherever required and arrange them in such a manner as to facilitate, without injuring or disfiguring the interior, the installation or replacement of any cable or wire which may be required to furnish service to any part of the building.

4. A glossary of wiring terms used is appended.

CLASSIFICATION OF BUILDINGS

5. Buildings may be classified in regard to the distribution of telephone facilities as follows:

(a) Office and Loft Buildings.

(b) Apartment and Hotel Buildings.

6. This classification results from the method employed in designing the telephone facilities.

7. The first class undergoes a shifting of telephonic density, which precludes any attempt to install wires permanently in any given location.

8. The second class of buildings has a certain telephonic development, which usually may be considered as two lines per apartment and one line per hotel room. Apartment house tenants often desire a direct line to the central office in addition to local house service.

GENERAL FACILITIES FOR ALL TYPES OF BUILDINGS.

MAIN CABLE

9. Provision should be made for the entrance of the main or exchange cable into the basement. This entrance will be made in all cases, a distance of approximately two (2) feet, below ground level. This cable

and protecting conduit will be installed by the Telephone Company. Information as to the point of entrance should be obtained from the local manager.

10. Table I gives the sizes of wall openings for main cable entrance. Hooks or racks should be installed for the support of the main cable from its point of entry to the main terminal cabinet. These supports should be placed at intervals not exceeding three (3) feet.

TERMINALS

11. Where lead covered cables are connected to open pairs of wires terminals are used. Terminals are also used in some cases for connection between two lead covered cables. They consist of a number of punchings to which the cable wires and house wires are connected, either by soldering or by means of binding posts.

12. These terminals are located in cabinets which are named according to their location or their function. A main terminal cabinet is installed in the basement for the purpose of connecting the exchange cables to the riser cables. A hall terminal cabinet is installed on each floor in the vicinity of the riser shaft for the purpose of connecting the floor cable to the distributing wires from the individual telephones. Distributing cabinets perform the same function as hall terminal cabinets, except that they are located at points distant from the riser shaft. The cabinets shown on the plates are of wood, but sheet iron cabinets of the same form may be used in fireproof buildings.

MAIN TERMINAL

13. Space should be provided near the foot of the riser cable shaft for the main terminal cabinet. When more than one riser shaft is to be provided, the main terminal cabinet should be located at the central point of the basement end of the group, and must be in a dry place and accessible at all times. An electric lighting circuit should be available near the cabinet. The cabinet and connecting strips will be installed by the Telephone Company. Plate II shows the assembly of a main terminal cabinet and Table II gives the minimum wall space required for a given number of lines.

RISER CABLES

14. All cables extending from the main terminal to the various floors in the building are known as riser cables. When riser cables are to be carried any distance horizontally through the basement, supports should be provided as specified for the main cable. Table III gives the dimensions and weights of lead covered paper insulated cables used for risers.

RISER SHAFTS

15. The best form of enclosure for riser cables is a vertical shaft, extending through every floor of the building. These shafts may be made of wood, tile or steel, but should be of uniform cross section throughout their length.

16. The number of riser shafts required in a building depends upon the height, floor area and the number of telephones. Table IV, A to E, gives the approxi-

mate number of shafts for rectangular buildings of known ground area and telephonic density. For example: A 10 story office building having an area of 30,000 sq. ft. per floor would require 4 riser shafts if the expected density is one telephone per 250 sq. ft. of floor space. (See Table IV-A). In general, all shafts should be in the center of equal areas. The number of shafts should never be so great as to reduce the number of wires in the floor cables to less than 10 pairs.

17. It is inadvisable to erect risers in elevator shafts. When riser shafts cannot be erected separately, provision should be made for carrying the cables in vent shafts or conduits. The cable need not be incased except at points where it may be subject to abrasion or present a bad appearance. When riser cables are to be erected in vent shafts, provision must be made for supporting them and for the entry of the floor cables at each floor. No pipes, cables or wires will be permitted in the riser shaft other than those installed by the Telephone Company. Plate VI shows an approved method of erecting riser cables in vent shafts. Table V gives the minimum dimensions of riser shafts for a given number of lines.

RISER CABLE SUPPORTS

18. All riser cables should be supported at each floor by approved clamps secured to nailing strips in the shaft.

19. All nailing strips should be 2"x4" in cross section in each shaft, as shown on Plate III. Access should be had to the headers by shaft openings,

which may be covered by the floor terminal doors, or by separate covers screwed to the shaft walls.

LOCATION OF POTHEADS

20. Plate IV shows the floor location of all splicing points in a building, whether fed by one or more risers. At each splicing point provision should be made in the shaft for a pothead. Table VI gives the dimensions of the shaft at such points. Plate III illustrates a method of covering the splicing cabinet with a removable panel.

RISER CONDUIT

21. When it is impossible to install riser shafts or to utilize vents, conduit may be used for riser cables.

22. Not larger than 200 pair cables should be installed in conduit. A spare conduit, 1" in diameter, should be installed between all floors to allow for interconnection.

23. All splices will be located at floors indicated on Plate IV and all conduit should terminate in splicing cabinets at these points.

24. Plate V shows an approved method of installing riser conduit, and the location of splices and terminals.

25. All floor cables will be carried in individual conduits from the splicing cabinet to their respective floor terminals.

26. All riser conduits should be fairly free from bends. Table VII gives the sizes of riser conduits. When a bend is necessary the radius of curvature will be governed by Table VIII.

27. All riser conduits should be carefully inspected for rough projections which might injure the cable. They should be tagged, fished and plugged to keep out dirt when not used.

28. Conduits may be placed near other service wires, pipes, etc., with the exception of steam and hot water mains.

29. All riser conduits should terminate in the basement without a bend and provision should be made for the main terminal cabinet on the left side of the conduit opening.

30. Table VI governs the size of the splicing cabinets.

31. A 2"x4" nailing strip should be placed in the rear wall of each splicing cabinet at a point near the center as specified under "Riser Cable Supports."

HALL TERMINAL CABINETS

32. In all types of buildings using shafts or conduits for riser cables, terminal cabinets should be installed below the corridor mouldings and in close proximity to the riser shaft.

33. Plates III, V, and VI illustrate approved methods of mounting terminal cabinets.

34. When mounted in the front wall of the shaft, they should not obstruct the passage of cables. They should have a hinged door provided with a spring catch. Plate VII shows two types of approved terminal cabinets, and gives tables of minimum dimensions. All cabinets should be bored for the entrance of cables and distributing wires.

35. Proper sizes of conduit, as specified in Table IX, should be installed between the hall mouldings, and between the hall moulding and the distributing cabinet.

36. The terminals will be mounted in the cabinets by the Telephone Company.

FLOOR DISTRIBUTION FOR HOTELS.

37. When the number and location of the telephones are known, the building may be wired in a permanent manner.

38. Conduits of the proper size may be installed from the hall terminal cabinet to each room. These conduits may carry a number of wires and feed a portion of the floor. At distributing points outlet boxes should be provided. These boxes should be placed adjacent to the hall or room moulding and be easily accessible.

39. When the exact location of the telephone is known, a conduit may be in-

stalled from the upper edge of the moulding, or from the outlet box to the point of attachment of the instrument. Where wall type instruments are to be used, the conduits should open outward at a point 4′ 10″ above the finished floor. Where portable types are used, the conduits should open outward at the upper edge of the mop board. The openings should be flush with the finished wall.

DISTRIBUTING TERMINAL CABINETS

40. When a single riser shaft is used for feeding more than thirty (30) telephones per floor it may be advisable to make several taps and locate distributing cabinets at the centers of distribution. The specifications for hall terminal cabinets also apply to distributing cabinets. They should be installed flush with the wall just below the moulding and be connected thereto by two conduits of proper size.

41. These cabinets may be located accurately by marking each station upon the floor plan, and grouping those whose wires will traverse a distance exceeding fifty (50′) feet in the same direction. Usually sub-cabinets will be located at points where corridors meet or intersect. Plate VII shows a distributing cabinet in position.

42. Floor cables may be installed in conduits or laid along corridor mouldings. Table X gives the dimensions of conduits for different sizes of lead covered floor cables.

WIRING OF APARTMENT BUILDINGS.

43. When the number of apartments per floor exceeds three, a terminal should be located on each floor and a riser shaft or conduit provided as specified.

44. On account of the shifting of telephones no floor wiring should be of a permanent character. Seldom will the development justify more than one riser, and unless the shape of the building demands, all wires on a floor will distribute from one terminal. Where on account of the absence of hall mouldings, a central shaft cannot be provided, the facilities should consist of vertical conduit as shown on Plate IX, distributed on each floor as shown on Plate XIII.

45. Each apartment should be connected by moulding or conduit to the floor terminal. No attempt should be made to install conduit between the moulding and the point of attachment of the instrument. All room moulding should be connected by ½" conduit, where walls or other obstructions intervene. This will permit the passage of wires without boring holes through finished walls.

MOULDINGS

46. The best method for supporting and concealing wires, which extend from the floor cabinet to the instrument, is to use the corridor and room moulding. The area of the moulding trough should be sufficient to carry all necessary wires and cable.

47. Plate VIII shows a section of room and hall moulding with partition conduits, and Table XII gives the trough dimensions for concealing wires and cables. All room moulding should have minimum trough dimensions of ½"x¼".

48. Where a wall intercepts a line of moulding, or where for any reason, cable or wires must pass an obstruction, a conduit path of proper size, as specified in Tables IX and X, should be provided.

CONNECTING HALL AND ROOM MOULDING

49. In buildings provided with hall mouldings every apartment should be connected by a ½" conduit to these mouldings. This conduit should be located at the corner of the room nearest the floor terminal cabinet so as to reduce to a minimum the length of wire required. Plate VIII shows the proper use of such a conduit.

CROSSING CORRIDORS AND HALLS

50. A crossing conduit should be installed at every floor cabinet and at intersections of halls, to avoid exposed wiring and long runs of wire around the ends of hallways.

51. Plate VIII shows such a conduit between two hall mouldings and illustrates the method of opening the conduits into outlet boxes.

52. Where a crossing conduit connects with a terminal cabinet, it should enter at the upper right hand corner, adjacent to the conduit which leads to the moulding, as shown on Plate III.

APARTMENT HOUSE VESTIBULE SETS

53. When a flush type vestibule set is to be used for connection to a local apartment house system, provision should be made for lead covered cable of the proper size to be run in conduit or shafting to the foot of the riser shaft.

54. The vestibule set will be mounted in a wooden box which is set into and flush with the finished wall. The dimensions of this box vary with the capacity and may be obtained by consultation with the local manager.

OFFICE AND LOFT BUILDINGS.

TELEPHONE DENSITY IN OFFICE BUILDINGS

55. Considerable study is required in determining the maximum number of telephones that will be required in an office building and the distribution on the various floors.

56. The total number of telephones in a building will not vary greatly and may be determined in the following manner:

57. Determine by inquiry the number of telephones in adjacent buildings used for similar purposes and housing the same class of tenants. Divide the total floor area of these buildings by the total number of telephones and obtain for the locality the number of square feet per telephone. This constant may be divided into the total floor area of the building in question to determine the average total number of telephones.

58. The maximum number of telephones in the building at one time is estimated from the following:

(a) The character and business prospects of the vicinity.
(b) The present condition of business.
(c) The average number of telephones determined by comparison.

59. The maximum number of telephones mentioned above should be divided by the number of floors to obtain the average maximum number of telephones per floor. This value is used in all calculations and is the one referred to in connection with the floor cabinets. This average may be modified for each floor by a consideration of the following items:

(a) The relative size of the offices on different floors.
(b) The relative rental value of the different floors.
(c) Special long leases of tenants, whose demands for service are known.

60. The locations of the telephones in the rooms are not permanent, and may be changed to meet the requirements of the tenants.

WIRING

61. All shafts or conduits should be run as specified from the point of entrance in the basement to the floor cabinets.

62. All wiring should be of temporary character from the floor cabinets to the various parts of the building. No conduits should be installed for floor wires. Plate XII shows a typical office building floor plan.

63. Where several risers are used no sub-cabinets need be installed.

CABINETS

64. All cabinets and sub-cabinets shall be of double the capacity, that would be demanded by average development.

RISER SHAFTS AND CONDUIT

65. All riser shafts and conduits should have a capacity 30% greater than that determined by the estimated development, to allow for flexibility.

DISTRIBUTING CABINETS

66. Where on account of the design of the building only one riser shaft can be provided, but the number of telephones justifies more, distributing cabinets should be installed at the various centers of distribution. These cabinets should be connected by lead covered cables to the riser cable.

67. These connecting cables should have twice the number of wires required for average development. Provision should be made for carrying such cables on mouldings or in conduits as desired.

CROSSING CONDUITS

68. Crossing conduits should be installed where needed, as specified for hotels and apartments.

69. All offices should be connected to the hall moulding by ¾" conduit.

MOULDINGS

70. Hall and room mouldings should be provided for distributing wires. They should be of such dimensions as to carry double the number required by the expected development. Plate VIII shows an approved type of moulding. Table XII gives dimensions of moulding troughs for various sizes of cables.

PERMANENT LOCATIONS IN LARGE OFFICES.

71. When specified by the owners, offices may be wired permanently from the floor outlets. In such cases care must be taken to accurately locate the conduit outlets, so that they will be adjacent to the probable location of desks and tables.

72. All conduits should be of the proper size as specified in Table IX and should have a minimum number of bends between outlets. Plate X shows such a conduit arrangement. All conduit should be fished, tagged and plugged during installation. Conduit smaller than ¾" should not be used in long runs.

73. Where it is expected that inter-communicating service will be required the sizes of conduit should be determined from Table X, which shows the size of conduit required for a given total number of telephones in the office. These sizes are based upon the use of cable and should obtain in all parts of the system. The diameter of the outlet shown on Plate XI should be not less than 1½" to admit two cables, one from either direction.

FLOOR CONDUIT OPENING

74. The conduit should terminate in a water tight outlet set flush with the finished floor, at a point in the floor adjacent to the proposed location of the telephone. It should be capped flush to keep out dirt while not in use.

FLOOR OUTLET BOXES

75. The type of floor outlet box shown on Plate XI is approved by the Telephone Company, and on account of its low price is preferable to any other type of electric floor outlet now on the market.

DESK TERMINAL STRIPS

76. All connections to telephones and to portions of cables will be made on a terminal strip by the Telephone Company. This terminal strip will be mounted on the side of a desk in an inconspicuous place at a point not less than one (1') foot above the finished floor.

PRIVATE EXCHANGES.

77. When a switchboard is to be located in a certain office, no facilities are needed other than those which are to be provided for the expected telephonic development.

78. When a large majority of the telephones in a building are connected to one switchboard, special provision of space may be necessary. In such cases the dimensions of the board and the size of the battery room should be determined by consultation with the local telephone manager.

79. The capacity of the switchboard will be determined by the local manager.

80. The facilities for cable to the switchboard should suffice for the ultimate capacity of the board in lines and trunks,as all wires from the switchboard must go to the main terminal cabinet in the basement.

81. The battery room is usually located in the basement.

WIRING SPECIFICATIONS.

82. When a contract calls for the complete wiring of all floors, as well as the provision of riser shaft and terminal cabinets, the following specifications will govern the choice of material and methods of installation.

FLOOR CABLES

83. All cables used for interior construction shall be lead covered and waterproof. The core shall be made up of No. 22 B. & S. gauge conductors arranged in twisted pairs. Each conductor shall have a double silk and single cotton insulation so colored as to distinguish it and its mate from all of the other wires in the cable. It shall have an insulation resistance of 100 megohms per mile.

84. The floor cables should be installed in an approved manner between the riser pothead and the hall terminal cabinets. The cables should not be formed and connected to the terminals by the builder, as the Telephone Company prefers to complete this work at the time of installation of the telephones.

HOUSE WIRING

85. All wiring between terminal cabinets and the telephone instruments should be done with wire not smaller than No. 19 B. & S. gauge. This wire should have a good rubber insulation, and be not less than 3/32" in diameter, measured over the rubber insulation of any conductor. The rubber should be protected by a close braid over each conductor. The two conductors of a pair should be twisted together with one complete twist in every three inches.

86. All wiring shall be so placed as to be easily removable. No wiring should be sealed in the plaster on account of the rapid deterioration of the wires and the impracticability of replacing them in the same manner.

87. All soldered connections between wires should be taped with rubber tape, and then covered with approved friction tape. All joints in a twisted pair should be separated at least six (6) inches.

88. At points of connection to the terminal and telephones, all wires should have a spare length of forty-eight (48) inches.

89. If wires require stapling, no two wires should be secured under one staple, and only staples having insulated heads should be used.

90. The number of wires required for each telephone will depend on the system to be installed, and this information should be obtained from the Telephone Company.

GLOSSARY.

CABINET	A box with finished hinged cover containing terminals to which are connected the cable conductors and house wires.
CONDUIT	A hollow cylindrical pipe made of wrought iron or clay, used to encase the wires and cables.
DENSITY	The number of square feet of floor space per telephone.
DEVELOPMENT	Referring to the extent of the demand for telephone service.
FACILITIES	Refers to the routes which are provided for telephone wires while the building is under construction.
FISH	To run a wire through a conduit or space between walls.
FLOOR CABLE	A small leg of cable, which serves the telephones on a floor, and splices to the main cable at a pothead.
POTHEAD	A large cylinder of lead enclosing a splice between the riser cables and several floor cables.
RISER	A main cable extending from the basement terminal to all floors requiring telephone service.

Table I

Dimensions for Basement Wall Opening.

Number of Lines in Building.....	400	800	1200
Dimensions of Opening.....	5"x5"	5"x10"	5"x15"

Table II

Wall Space Occupied by a Main Terminal Cabinet.

Capacity of Cabinet.

No. of Prs. of Wires To Exchange	No. of Prs. of Wires To Building	See Plate II. Dimensions "A"	Dimensions "B"
100	100	5'0"	2'6"
200	200	4'6"	2'6"
300	300	4'6"	2'6"
600	600	4'6"	5'6"
800	800	4'6"	8'0"

Table III

Size and Weight of Riser Cables.

No. of Pairs.. 10	25	50	75	100	150	200	250	300	400
Outside Dia..17/32"	23/32"	15/16"	1 3/32"	1 5/16"	1 17/32"	1¾"	1 15/16"	2 1/16"	2⅜"
Lbs. Wt. pr. Ft. .647	.963	1.35	1.75	2.25	2.81	4.1	4.7	5.14	6.3

Table IV

Total Number of Riser Shafts Required.

Density=1 telephone per 250 sq. ft. of floor space.

	Floors	2	4	6	8	10	12	14	16	18
	Sq. Ft. per Floor	Number of Riser Shafts Required								
	2000	1	1	1	1	1	1	1	1	1
	5000	2	1	1	1	1	1	1	1	1
A.	10000	4	2	1	1	1	1	1	1	1
	20000	4	4	2	2	2	2	1	1	1
	30000	6	4	4	4	4	2	2	2	2
	50000	10	8	8	8	8	6	6	4	4

Density=1 telephone per 500 sq. ft. of floor space.

	Floors	2	4	6	8	10	12	14	16	18
	Sq. Ft. per Floor	Number of Riser Shafts Required								
	2000	1	1	1	1	1	1	1	1	1
	5000	2	1	1	1	1	1	1	1	1
	10000	2	1	1	1	1	1	1	1	1
B.	20000	4	2	1	1	1	1	1	1	1
	30000	6	6	4	4	4	4	4	2	2
	45000	8	8	6	6	6	6	4	4	4
	60000	10	8	8	8	6	6	6	4	4

Density=1 telephone per 1000 sq. ft. of floor space.

	Floors	2	4	6	8	10	12	14	16	18
	Sq. Ft. per Floor	Number of Riser Shafts Required								
	2000	1	1	1	1	1	1	1	1	1
	5000	1	1	1	1	1	1	1	1	1
C.	10000	1	1	1	1	1	1	1	1	1
	24000	4	2	2	1	1	1	1	1	1
	48000	6	4	4	4	4	4	2	2	2
	60000	8	6	6	6	4	4	4	4	4

Density=1 telephone per 2000 sq. ft. of floor space.

	Floors	2	4	6	8	10	12	14	16	18
	Sq. Ft. per Floor	Number of Riser Shafts Required								
	2000	1	1	1	1	1	1	1	1	1
	5000	1	1	1	1	1	1	1	1	1
D.	10000	1	1	1	1	1	1	1	1	1
	40000	4	2	2	2	2	1	1	1	1
	80000	6	4	4	4	4	4	4	4	2
	120000	8	6	6	4	4	4	4	4	4

Density=1 telephone per 3000 sq. ft. of floor space.

	Floors	2	4	6	8	10	12	14	16	18
	Sq. Ft. per Floor	Number of Riser Shafts Required								
	2000	1	1	1	1	1	1	1	1	1
	5000	1	1	1	1	1	1	1	1	1
E.	10000	1	1	1	1	1	1	1	1	1
	60000	4	2	2	1	1	1	1	1	1
	120000	6	4	4	4	2	2	2	2	2

Table V

Riser Shaft Dimensions.

Prs. of Wires in Shaft	100	200	400	800
Shaft Dimensions	4"x6"	4"x6"	6"x10"	6"x12"

Table VI

Space for Riser Potheads.

Prs. of Wires in Shaft	100	200	400	800
Dim. of Splicing Cabinet	4"x6"x33"	4"x8"x36"	6"x10"x48"	6"x12"x60"

Table VII

Conduit Sizes for Riser Cables.

No. of Prs. in Cable	15	25	50	100	200
Size of Conduit	1¼"	1¼"	1½"	2"	2½"

Table VIII

Radii of Curvature in Riser Conduit Bends.

Size of Conduit	1¼"	1½"	2"	2½"	3"
Radii	12"	18"	24"	30"	36"

Table IX

Conduit Sizes for Rubber Covered Wire.

Prs. of Wires	2	5	10	20	40
Size of Conduit	½"	¾"	1"	1¼"	2"

Table X

Conduit Sizes for House Cables.

Pairs in Cable	5	10	20	30
Conduit Sizes	¾"	⅞"	1"	1¼"

Table XI

Conduit Sizes,

For Intercommunicating Systems.

Number of Telephones	Min. Dia. of Conduit
10	1"
20	1½"
30	1½"

Table XII

Moulding Dimensions.

Trough Depth & Width	Sizes of Cable	Open Wires
½	5 Pr.	5 Pr.
⅝	15 Pr.	7 Pr.
¾	25 Pr.	10 Pr.
1	50 Pr.	15 Pr.

Table XIII

Dimensions of Conduit Boxes at Potheads.

Pairs in Cable	Space Occupied By Potheads
100	3"x12"x36"
200	4"x14"x36"
400	4"x18"x60"
800	4"x18"x60"

PLATE I
General Wiring Arrangement

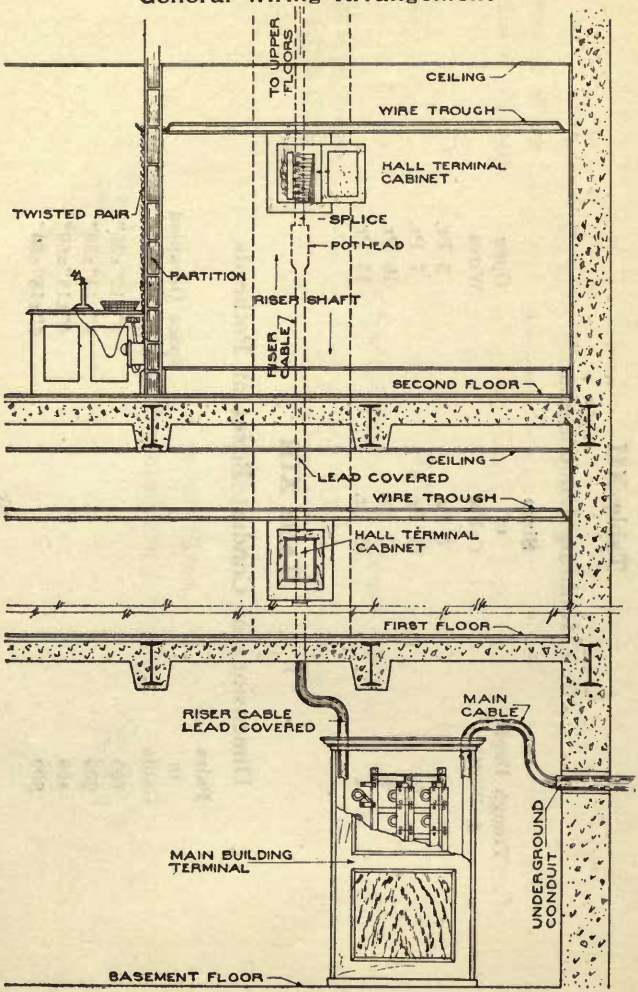
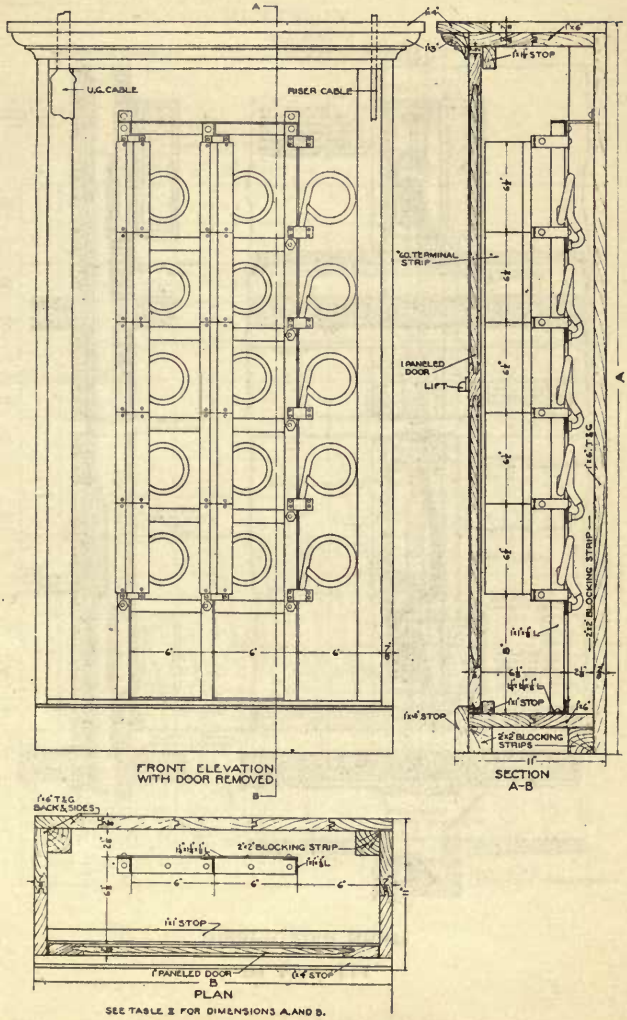


PLATE II
Main Terminal Cabinet



SEE TABLE II FOR DIMENSIONS A AND B.

PLATE III

Riser Cable Shaft

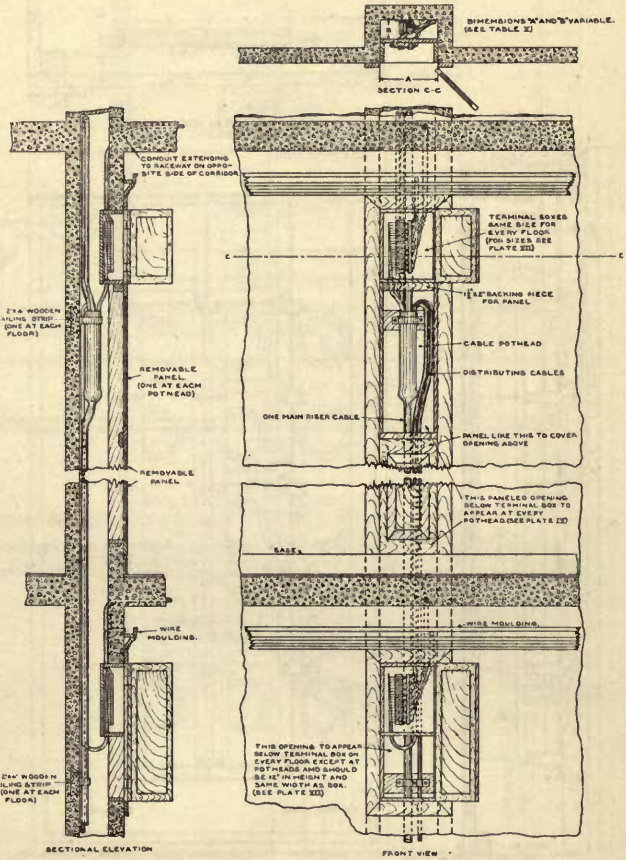


PLATE IV

Floor Location of Potheads

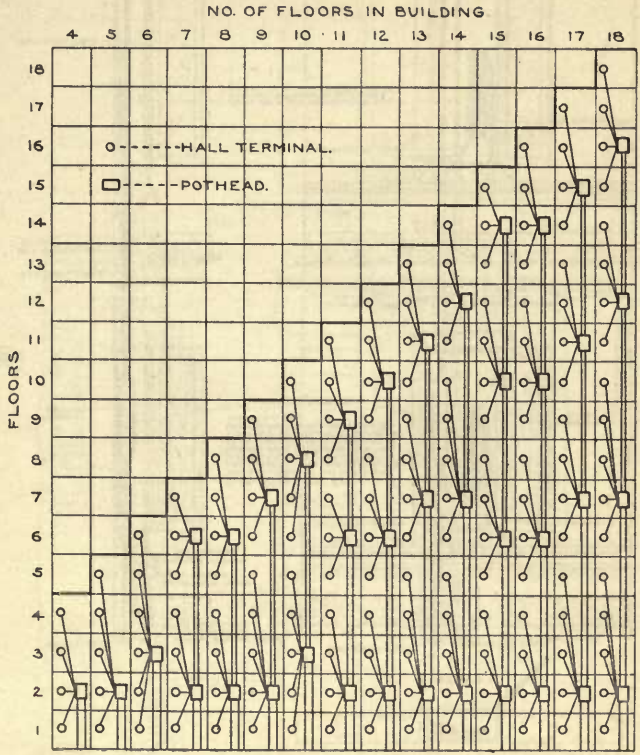


PLATE V

Conduit Used for Riser Cables

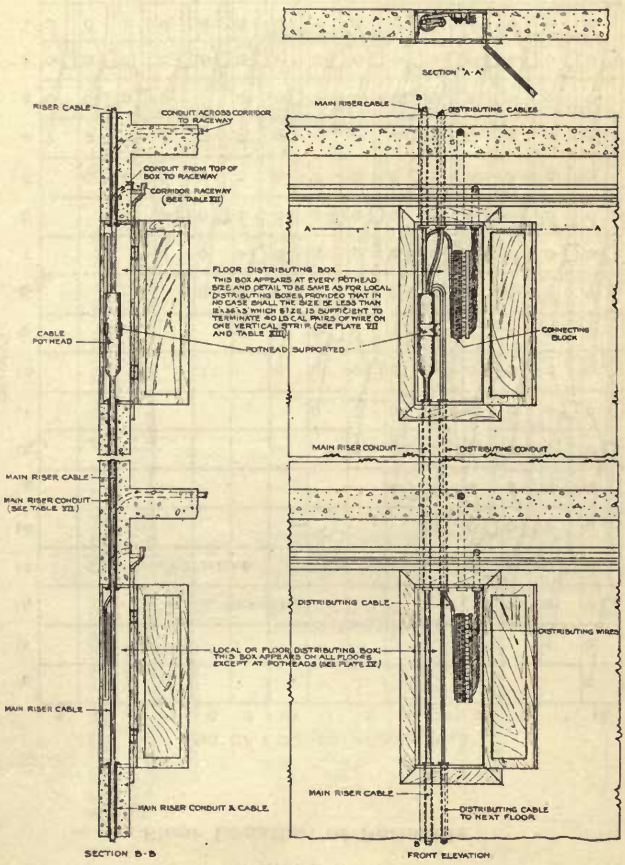


PLATE VI

Vent Shaft Used for Riser Cables

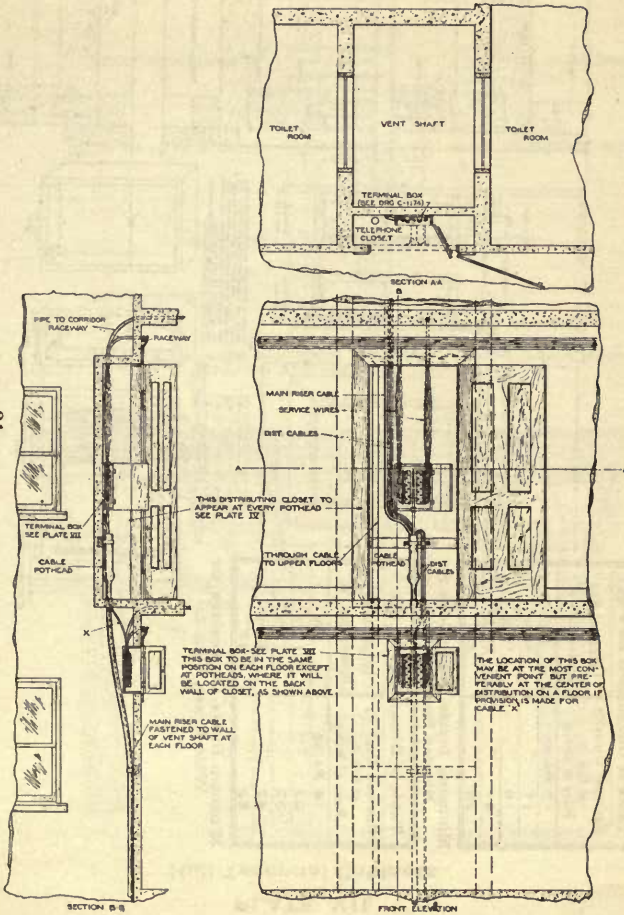


PLATE VII

Hall Terminal Cabinets

Table of Dimensions for Fig. 1	
Maximum Capacity of Box in Pairs of Wires	Length of Box Dimensions "A"
7 PAIRS	9 5/8"
11 "	12 5/8"
16 "	16 3/8"
21 "	20 1/8"
26 "	22"

Minimum Inside Dimensions for Narrow Boxes. Fig. 1.

Table of Dimensions for Fig. 2	
Maximum Capacity of Box in Pairs of Wires	Length of Box Dimensions "A"
14 PAIRS	9 5/8"
22 "	12 5/8"
32 "	16 3/8"
42 "	20 1/8"
52 "	22"

Minimum Inside Dimensions for Wide Boxes. Fig. 2.

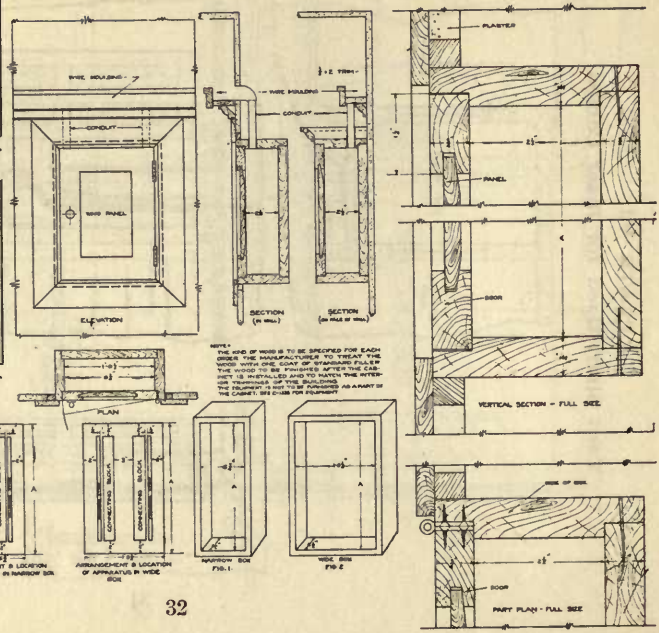
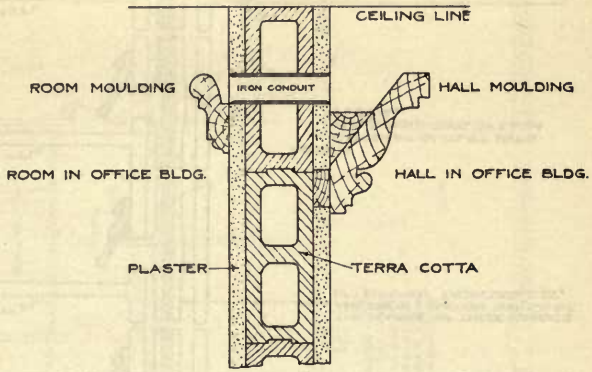
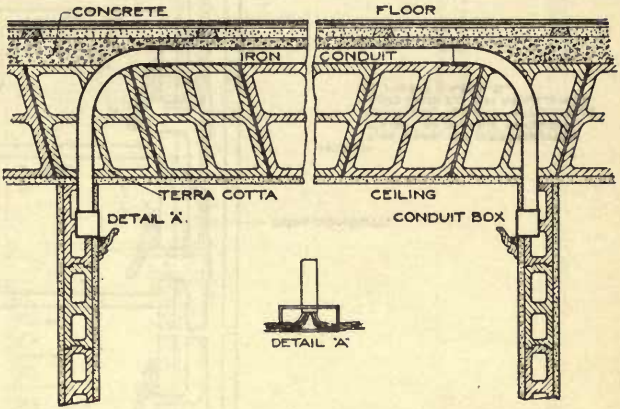


PLATE VIII



A CROSS SECTION OF PARTITION SHOWING HALL MOULDING, ROOM MOULDING AND PARTITION CONDUIT.



B METHOD OF PLACING IRON CONDUIT ACROSS CEILING OF CORRIDOR.

PLATE IX
Vertical Distributing System

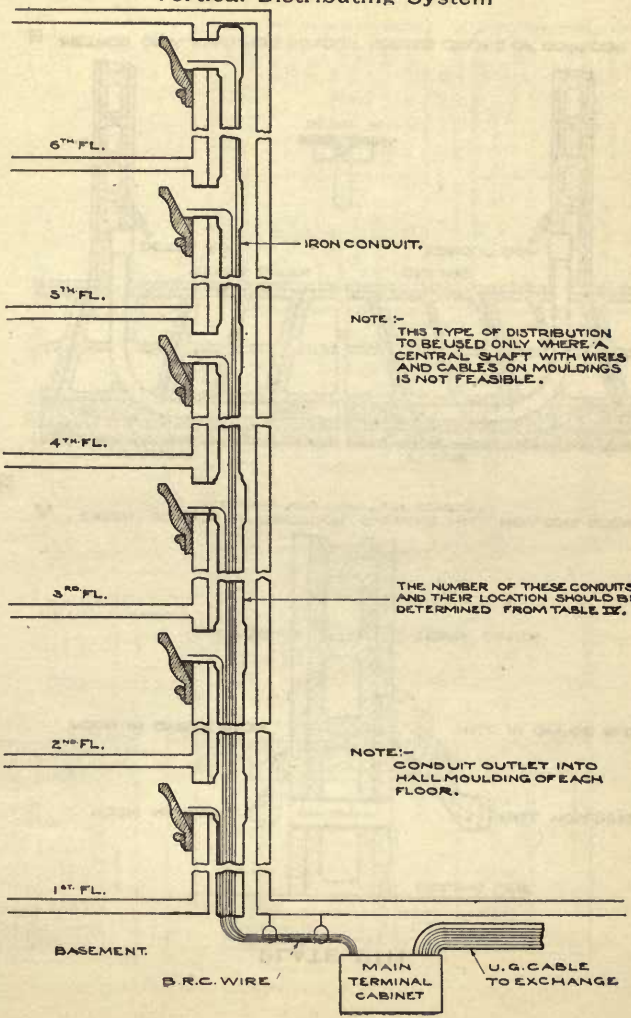
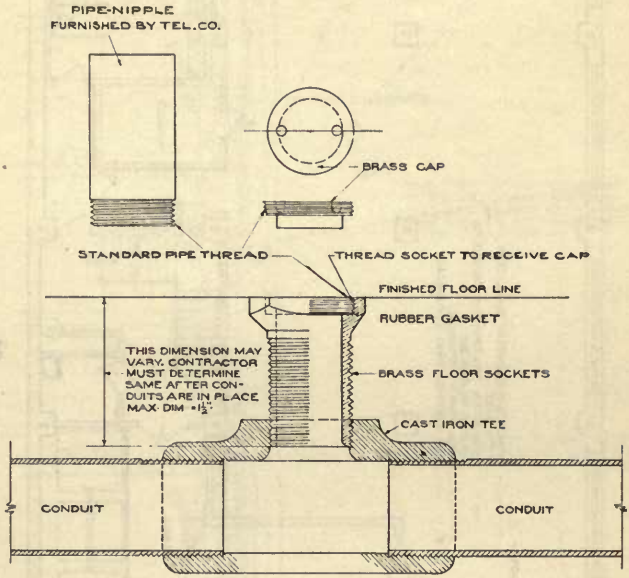


PLATE X

Floor Outlet Scheme for Permanent Locations

PLATE XI

Floor Outlet Box



DETAIL OF TYPICAL FLOOR OUTLET FROM CONDUIT

1" CONDUIT SHOWN-USE SAME PROPORTION FOR OTHER SIZES 1¼-1½"& 2"

PLATE XII

Typical Office Building Floor Plan

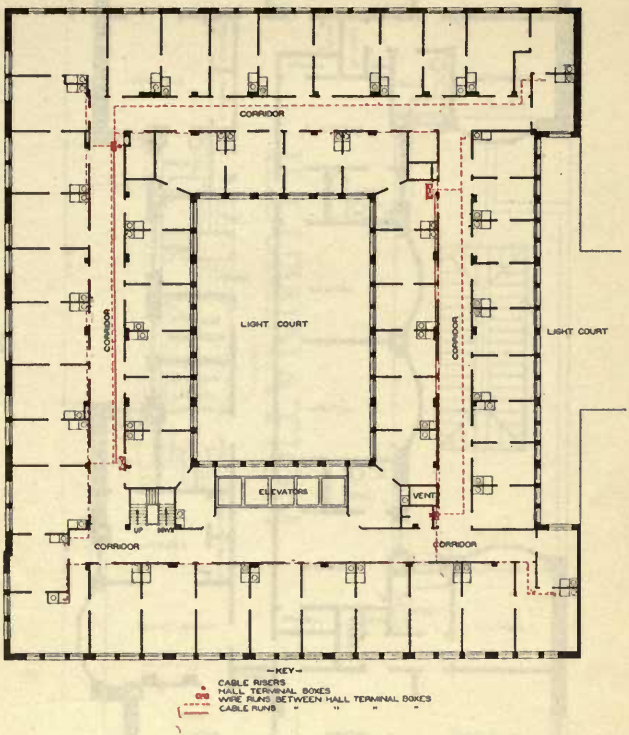
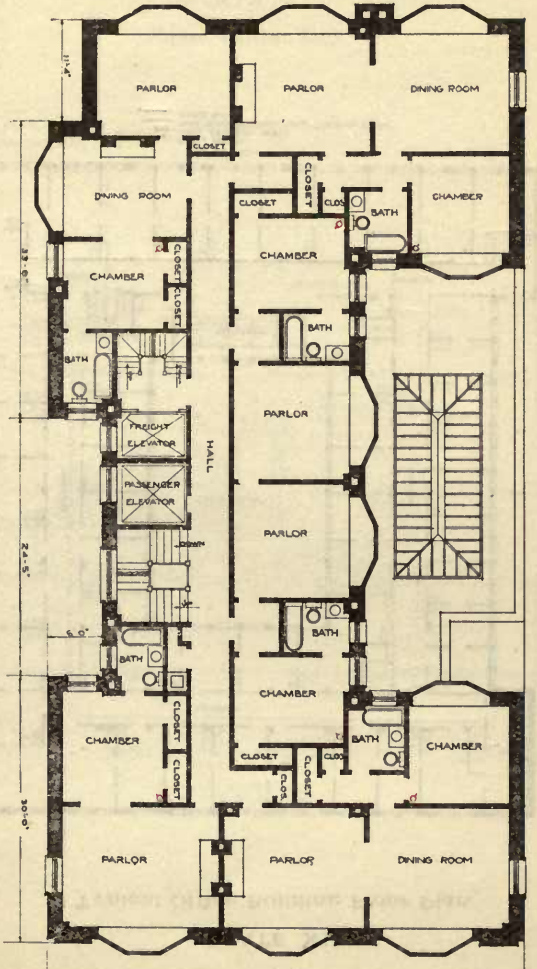


PLATE XIII

♁ Outlet Above Moulding. See Plate IX



Typical Apartment Building Floor Plan

ILLUMINATION

LIST OF TABLES.

TABLE 1. Required Intensity of Illumination.

TABLE 2. Intensity of Illumination in Foot Candles on Horizontal Planes.

TABLE 3. Illumination from Mazda Lamps (small size) with Extensive Holophane Reflectors.

TABLE 4. Illumination from Mazda Lamps (large size) with Extensive Holophane Reflectors.

TABLE 5. Illumination from Mazda Lamps (small sizes) with Intensive Holophane Reflectors.

TABLE 6. Illumination from Mazda Lamps (large sizes) with Intensive Holophane Reflectors.

TABLE 7. Illumination from Mazda Lamps (small sizes) with Focusing Holophane Reflectors.

TABLE 8. Illumination from Mazda Lamps (large sizes) with Focusing Holophane Reflectors.

TABLE 9. Reflection Co-efficients of Walls and Ceilings.
TABLE 10. Average Percentage of Reflection from Walls and Ceilings.
TABLE 11. Spacing of Units for Uniform Illumination.
TABLE 12. Current Taken by Incandescent Lamps.
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TABLE 14. Size of Wire for One Volt Drop.
TABLE 15. Total Cost of Lighting with Mazda Lamps.
TABLE 16. Total Cost of Lighting with Tantalum Lamps.
TABLE 17. Total Cost of Lighting with Gem Lamps.
TABLE 18. Total Cost of Lighting with Carbon Lamps.
TABLE 19. Intrinsic Brilliancy of Light Sources.
TABLE 20. Lumens for Various Incandescent Lamps.

ILLUMINATION

Since the wiring of buildings for electric lighting is so closely related to the wiring of buildings for telephone service, we have secured permission from the National Electric Lamp Association to publish in this appendix the following data which has been slightly rearranged for convenience.

Only a small portion of this appendix is devoted to the subject of "Wiring," as this subject has been treated extensively by the National Board of Fire Underwriters and is generally understood by all architects and builders.

Illumination is not so generally understood on account of its recent development along scientific lines. The major portion of this appendix is devoted, therefore, to outlining the method of laying out a lighting system in a building and to supplying working data, so as to simplify the calculations required in the study.

REQUIREMENTS FOR GOOD ILLUMINATION.

Illumination must be acceptable to the eye. We should be able to see objects clearly and with a minimum of fatigue. To accomplish this result, certain conditions must be fulfilled.

(a) There must be sufficient illumination. Since objects are seen by means of the amount of light which they reflect, more light must be thrown on dark objects than on light ones.

(b) There must not be too much illumination. Too strong a light tires the eye.

(c) Intensely bright lights in the field of vision should be avoided. The intrinsic brilliancy or candle power per square inch of luminous area should therefore be kept as low as possible, not ordinarily greater than 4 to 6, if the source of light is in the field of vision. Incandescent lamps should either be shaded or frosted. See Table No. 19.

(d) Flickering lights should be avoided.

(e) Lamps should be shaded or so placed that the direct rays do not strike the eye.

(f) Streaks or striations are very undesirable.

(g) A satisfactorv light must be of a proper quality. It should have a continuous spectrum, i. e., one containing every color in order that the relative color values of objects illuminated may be the same as when seen by daylight. Avoid cold, glaring lights which are too rich in green and blue.

DESIGNING THE ILLUMINATION FOR A BUILDING.

POINT BY POINT METHOD

1. Divide each floor or each room into areas in which a different intensity of illumination is desired. Consult Table 1 or other authorities upon the foot candles required in the various areas. A foot candle of illumination is the amount of light which illuminates a point one foot distant from a source of light having an intensity of one candle power.

2. Divide each of the areas into a number of equal squares in the center of which luminants are to be installed. The number of such sub-divisions depends upon the degree of uniformity in illumination desired.

3. Locate a luminant or unit at the center of each of the above sub-divisions at a height to be determined from Table 11. Where a greater intensity is required at any one location an additional unit may be installed or the regular unit may be increased in intensity. Obviously, uniformity procured by a large number of sub-divisions, will be attained only at a greater cost.

4. Select the types of lamps and reflectors to suit local conditions; tungsten, tantalum and carbon lamps are available and are commonly used for interior lighting. They are mentioned above in the order of their efficiencies. Focusing, intensive and extensive reflectors are used with these lamps.

5. Secure from the manufacturer of the reflector the distribution curve for the particular lamp in the reflector.

6. Select a number of points in each room at which it is desired to check the illumination. The number of such points and their location is dependent entirely upon the accuracy required and upon the local conditions.

7. Measure the horizontal and vertical distance from each point selected to each of the adjacent luminants. The illumination obtained from a luminant distant from the point in question, and out of its immediate sphere, may be neg-

lected, except where the intensity of illumination required is low and the units are large and widely spaced.

8. From Table 2 determine the intensity from each unit (considered as one candle power), in foot candles at the point in question. The angle between the light ray and a line perpendicular to the plane of the object illuminated is also given in Table 2. This angle applied to the curve of distribution for the lamp and reflector will determine the total candle power applied by the unit. Multiply the intensity in foot candles, secured above for one candle power, by the number of candle power projected from the luminant in order to obtain the number of foot candles from one unit upon the point in question.

9. Treat each adjacent unit the same, and sum the foot candles for the point in question. If lower than the assumed value it will be necessary to choose larger units or closer spacing.

10. Tables 3 to 8 inclusive give the intensity direct for Mazda lamps in Holophane reflectors. The use of these tables will reduce the calculation materially.

11. Table 9 gives the approximate co-efficients of reflection from wall papers; that is, the amount of reflected light expressed as a proportion of the total light received by the surface. These figures are based on the use of incandescent lamps.

12. Table 10 gives the average increase in illumination over the calculated value due to reflection from the ceiling and walls.

13. Table 11 gives the approximate height of lamps above the plane to be illuminated in order to secure uniform illumination.

14. From Table 12 determine the number of outlets required and the amount of current to be carried in different parts of the system.

15. Table 16 may then be consulted to determine the size of wire required to carry with safety the current in the different parts of the system.

16. Table 14 may then be consulted to determine the size of wire required to maintain the voltage of the lamps between the limits of the rating of the lamp. The table shows values for one volt drop; for two volts drop use double the values given.

17. The cost of producing the light may be approximated by reference to Tables 15 to 18 inclusive.

SHORT METHOD

18. A shorter but less accurate method of computing illumination than the "point by point" method just described is based on the fact that a certain definite quantity of light is required to illuminate one square foot of surface with an intensity of one foot candle. This unit is known as the "lumen."

19. When a lamp is capable of illuminating 400 square feet with an average intensity of one foot candle it may be rated at 400 (effective) lumens.

20. To find the number of lamps needed for a given installation multiply the area in square feet by the required intensity in foot candles, thus obtaining the total lumens, and then divide this product by the effective lumens per lamp, i. e., the lumens per lamp reaching the plane to be lighted. See Table 19.

21. The values given in Table 20 under "Mazda" lamps are for ordinary lighting with "Mazda" lamps and clear high efficiency reflectors in rooms with average or dark walls and ceiling. Where both ceiling and walls are very light the number of lumens may be increased by 25 per cent.

22. Where the light from a single lamp must be spread over a relatively great area, it is advisable to use an extensive form of reflector.

23. Where each unit lights a relatively small area or where more concentration is desired, the intensive reflector should be used.

24. Where an intensive light on a small area directly below the lamp is desired, a focusing reflector is used. This type is largely used in show windows, high narrow vestibules and other rooms having unusually high ceilings.

TABLE No. 1

Required Intensity of Illumination

	*Foot Candles Required
Auditoriums, Theatres	1.00 — 3.0
Bookkeeping	3.00 — 5.0
Corridors, Halls	.50 — 1.0
Depots, Assembly Halls and Churches	.75 — 1.5
Drafting Rooms	5.00 — 10.0
Desk Lighting	2.00 — 5.0
Engraving	5.00 — 10.0
Factories, General, where individual drops are used	4.00 — 5.0
Factories, Complete, no individual drops	4.00 — 5.0
Hotel Halls	1.00 — 1.5
Hotel Rooms	2.00 — 3.0
Offices (Waiting Rooms)	1.25 — 2.5
Offices (Private)	2.00 — 3.0
Offices (General)	3.00 — 4.0
Offices (where desk lights are used)	1.50 — 2.5
Post Offices	2.00 — 5.0
Reading	1.00 — 3.0
Residences	1.00 — 3.0
Stores (Light Goods)	2.00 — 3.5
Stores (Dry Goods)	4.00 — 6.0
Stores (Clothing)	4.00 — 7.0
Store Windows	5.00 — 20.0
School Rooms	2.00 — 3.0
Saloons, Cafes, depending on effects	2.00 — 5.0
Stations (Waiting Rooms)	1.50 — 2.5
Train Sheds	1.50 — 2.0
Warehouses	1.50 — 2.0

*A foot-candle is the intensity of illumination received by a surface held normal to the direction of the light at a distance of one foot from a light-source of 1 candle-power.

TABLE No. 2

Intensity of Illumination in Foot-Candles on Horizontal Planes at Points at Various Distances from a Light Source of 1 Candle-Power. Angle Between Light Ray and Line Perpendicular to Plane Illuminated

Horizontal Distance in Feet from Point Directly Under Light Source to Point Where Intensity of Illumination is Desired.

Height of Light Source in Feet Above Plane Illuminated	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
4	0° 0′ .06250	14° 2′ .05707	26°34′ .04472	36°52′ .03200	45° 0′ .02210	51°20′ .01524	56°19′ .01066	60°15′ .00764	63°26′ .00559	66° 2′ .00419	68°12′ .00320	70° 1′ .00249	71° 34′ .00198	72°54′ .00159	74° 3′ .00130	76° 4′ .00107	75°66′ .00090	76°46′ .00075	77°28′ .00064	78° 7′ .00055	78°42′ .00047
5	0° 0′ .04000	11°19′ .03771	21°48′ .03202	30°58′ .02522	38°40′ .01904	45° 0′ .01414	50°11′ .01050	54°28′ .00785	58° 0′ .00595	60°57′ .00458	63°26′ .00358	65°34′ .00283	67°23′ .00228	68°58′ .00185	70°21′ .00152	71°34′ .00126	72°39′ .00106	73°27′ .00090	74°29′ .00077	76°15′ .00068	76°56′ .00057
6	0° 0′ .02778	9° 28′ .02673	18°26′ .02372	26°34′ .01987	33°42′ .01600	39°48′ .01260	45° 0′ .00982	49°24′ .00766	53° 8′ .00600	56°19′ .00474	59° 3′ .00378	61°23′ .00305	63°26′ .00249	66°13′ .00205	66°48′ .00170	68°12′ .00142	69°27′ .00120	70°34′ .00102	71°24′ .00088	72°25′ .00076	73°18′ .00066
7	0° 0′ .02041	8° 8′ .01980	15°57′ .01814	23°12′ .01585	29°45′ .01330	35°32′ .01100	40°37′ .00893	45° 0′ .00722	48°49′ .00583	52° 7′ .00473	55° 1′ .00385	57°31′ .00316	59°45′ .00261	61°41′ .00218	63°26′ .00182	64°59′ .00154	66°23′ .00131	67°37′ .00113	68°45′ .00097	69°48′ .00084	70°43′ .00074
8	0° 0′ .01563	7° 8′ .01527	14° 2′ .01427	20°33′ .01283	26°34′ .01118	32° 0′ .00953	36°52′ .00800	41°10′ .00667	45° 0′ .00552	48°22′ .00458	51°20′ .00381	53°59′ .00318	56°19′ .00267	58°24′ .00225	60°15′ .00191	61°55′ .00163	63°26′ .00140	64°48′ .00121	66° 2′ .00105	67°10′ .00091	68°12′ .00080
9	0° 0′ .01235	6° 20′ .01212	12°32′ .01148	18°26′ .01054	23°65′ .00943	29° 3′ .00825	33°42′ .00711	37°52′ .00607	41°38′ .00516	45° 0′ .00437	48° 0′ .00370	50°42′ .00314	53° 8′ .00267	55°18′ .00228	57°16′ .00196	59° 3′ .00168	60°38′ .00146	62° 6′ .00126	63°26′ .00110	64°40′ .00097	65°46′ .00085
10	0° 0′ .01000	5°43′ .00985	11°19′ .00943	16°42′ .00879	21°48′ .00801	26°34′ .00716	30°58′ .00631	35° 0′ .00550	38°40′ .00476	41°59′ .00411	45° 0′ .00354	47°43′ .00305	50°11′ .00263	52°26′ .00227	54°28′ .00196	56°19′ .00171	58° 0′ .00149	59°32′ .00130	60°57′ .00115	62°14′ .00101	63°26′ .00089
11	0° 0′ .00826	5° 12′ .00816	10°18′ .00787	15°15′ .00742	19°59′ .00688	24°27′ .00623	28°37′ .00559	32°28′ .00496	36° 2′ .00437	39°17′ .00383	42°16′ .00335	45° 0′ .00292	47°30′ .00255	49°46′ .00223	51°50′ .00196	53°45′ .00171	55°30′ .00150	57° 6′ .00132	58°34′ .00117	59°56′ .00104	61°12′ .00092
12	0° 0′ .00694	4° 46′ .00687	9° 28′ .00668	14° 2′ .00634	18°26′ .00593	22°37′ .00546	26°34′ .00497	30°16′ .00448	33°42′ .00400	36°52′ .00356	39°48′ .00315	42°31′ .00278	45° 0′ .00246	47°17′ .00217	49°24′ .00191	51°20′ .00169	53° 8′ .00150	54°49′ .00133	56°19′ .00119	57°43′ .00106	59° 3′ .00094
13	0° 0′ .00592	4° 24′ .00587	8° 8′ .00571	12° 0′ .00547	17° 6′ .00617	21° 2′ .00481	24°46′ .00447	28°18′ .00404	31°34′ .00368	34°42′ .00329	37°34′ .00295	40°14′ .00263	42°44′ .00235	45° 0′ .00209	47° 6′ .00187	49° 6′ .00166	50°54′ .00148	52°36′ .00133	54° 10′ .00119	55°38′ .00106	56°59′ .00096
14	0° 0′ .00510	4° 5′ .00506	8° 8′ .00496	12° 8′ .00477	16°57′ .00454	19°39′ .00426	23°12′ .00396	26°34′ .00365	29°45′ .00334	32°44′ .00304	35°32′ .00275	38° 9′ .00248	40°37′ .00223	42°53′ .00201	45° 0′ .00180	46°58′ .00162	48°49′ .00146	50°31′ .00131	52° 7′ .00118	53°37′ .00107	55° 1′ .00096
15	0° 0′ .00444	3° 49′ .00442	7° 38′ .00433	11°19′ .00419	14°56′ .00401	18°28′ .00380	21°48′ .00356	25° 1′ .00331	28° 4′ .00305	30°58′ .00280	33°42′ .00256	36°16′ .00233	38°40′ .00212	40°56′ .00192	43° 1′ .00174	45° 0′ .00157	46°51′ .00142	48°34′ .00129	50°11′ .00117	51°43′ .00106	53° 8′ .00096
16	0° 0′ .00391	3° 35′ .00388	7° 8′ .00382	10°37′ .00371	14° 2′ .00357	17°25′ .00339	20°33′ .00321	23°38′ .00300	26°34′ .00280	29°23′ .00259	32° 0′ .00238	34°30′ .00219	36°52′ .00200	39° 6′ .00183	41°10′ .00167	43° 9′ .00152	45° 0′ .00138	46°46′ .00126	48°22′ .00115	49°53′ .00105	51°20′ .00095
17	0° 0′ .00346	3° 22′ .00344	6° 42′ .00339	10° 0′ .00331	13°15′ .00319	16°24′ .00306	19°26′ .00290	22°23′ .00274	25°12′ .00256	27°54′ .00239	30°28′ .00222	32°54′ .00205	35°13′ .00189	37°24′ .00174	39°29′ .00159	41°26′ .00146	43°16′ .00134	45° 0′ .00122	46°38′ .00112	48°11′ .00103	49°39′ .00094
18	0° 0′ .00309	3° 11′ .00307	6° 20′ .00303	9° 28′ .00297	12°32′ .00287	15°32′ .00276	18°26′ .00264	21°14′ .00250	23°55′ .00236	26°34′ .00221	29° 3′ .00206	31°26′ .00192	33°42′ .00178	35°49′ .00165	37°52′ .00152	39°48′ .00140	41°38′ .00129	43°22′ .00119	45° 0′ .00109	46°33′ .00100	48° 0′ .00092
19	0° 0′ .00277	3° 1′ .00276	6° 0′ .00273	8° 58′ .00267	11°53′ .00260	14°45′ .00251	17°31′ .00240	20°13′ .00229	22°50′ .00217	25°21′ .00205	27°46′ .00192	30° 4′ .00180	32°17′ .00167	34°22′ .00156	36°23′ .00145	38°17′ .00134	40° 6′ .00124	41°49′ .00115	43°27′ .00106	45° 0′ .00098	46°29′ .00090
20	0° 0′ .00250	2° 52′ .00249	5° 43′ .00246	8° 32′ .00242	11°19′ .00236	14° 2′ .00228	16°42′ .00219	19°17′ .00210	21°45′ .00200	24°14′ .00190	26°34′ .00179	28°49′ .00168	30°58′ .00158	33° 2′ .00147	35° 0′ .00137	36°52′ .00128	38°40′ .00119	40°22′ .00111	41°59′ .00103	43°32′ .00095	45° 0′ .00088

TABLE No. 3

Showing Illumination in Foot-Candles from "MAZDA" 25, 40, and 60-Watt, 100-125 Volt, Bowl-Frosted Lamps, equipped respectively with Holophane Extensive Clear High Efficiency Reflectors Nos. 106225, 106230, and 106250. (Top number in each space corresponds to the 25-watt, middle number to the 40-watt, and bottom number to the 60-watt Unit.)

Horizontal distance of point investigated in feet from point directly beneath Unit.

Height of Unit in feet above plane to be illuminated.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
4	0.95 1.63 2.67	0.94 1.64 2.64	0.87 1.37 2.58	0.71 1.32 2.12	0.48 0.83 1.35	0.29 0.43 0.80	0.18 0.28 0.48	0.12 0.17 0.30	0.08 0.12 0.20	0.05 0.08 0.14	0.04 0.06 0.10	0.03 0.05 0.09	0.03 0.04 0.06	0.02 0.03 0.05	0.02 0.03 0.04	0.01 0.02 0.03	0.01 0.02 0.03	0.01 0.01 0.02	0.01 0.01 0.02	0.01 0.01 0.01	0.01 0.01 0.01
5	0.61 1.04 1.71	0.61 1.05 1.70	0.59 1.03 1.69	0.52 0.95 1.57	0.43 0.78 1.27	0.31 0.53 0.66	0.21 0.34 0.56	0.14 0.23 0.38	0.10 0.16 0.27	0.07 0.11 0.18	0.05 0.08 0.13	0.04 0.06 0.10	0.03 0.06 0.08	0.03 0.04 0.06	0.02 0.03 0.05	0.02 0.03 0.04	0.01 0.02 0.03	0.01 0.02 0.03	0.01 0.01 0.02	0.01 0.01 0.02	0.01 0.01 0.02
6	0.42 0.72 1.18	0.42 0.73 1.18	0.41 0.72 1.18	0.39 0.68 1.15	0.34 0.61 1.00	0.28 0.53 0.86	0.21 0.37 0.60	0.16 0.26 0.43	0.11 0.17 0.30	0.08 0.13 0.21	0.06 0.09 0.16	0.05 0.07 0.12	0.04 0.05 0.09	0.03 0.04 0.07	0.02 0.04 0.08	0.02 0.03 0.04	0.02 0.02 0.04	0.01 0.02 0.03	0.01 0.02 0.03	0.01 0.02 0.02	0.01 0.01 0.02
7	0.31 0.53 0.87	0.31 0.64 0.87	0.31 0.63 0.86	0.29 0.51 0.86	0.27 0.49 0.81	0.24 0.44 0.71	0.20 0.36 0.58	0.16 0.27 0.44	0.12 0.21 0.34	0.09 0.14 0.24	0.07 0.10 0.17	0.06 0.08 0.14	0.04 0.06 0.11	0.03 0.05 0.09	0.03 0.04 0.07	0.02 0.03 0.06	0.02 0.03 0.04	0.02 0.03 0.04	0.01 0.02 0.03	0.01 0.02 0.03	0.01 0.02 0.02
8	0.24 0.40 0.67	0.24 0.41 0.68	0.23 0.41 0.66	0.23 0.40 0.66	0.22 0.38 0.64	0.20 0.35 0.59	0.16 0.33 0.53	0.16 0.28 0.46	0.12 0.23 0.36	0.09 0.16 0.26	0.07 0.12 0.20	0.06 0.10 0.17	0.05 0.07 0.12	0.04 0.06 0.10	0.03 0.04 0.07	0.03 0.04 0.07	0.03 0.03 0.05	0.02 0.03 0.04	0.01 0.02 0.04	0.01 0.02 0.03	0.01 0.02 0.03
9	0.19 0.32 0.53	0.19 0.32 0.52	0.19 0.32 0.53	0.18 0.32 0.52	0.18 0.31 0.52	0.17 0.29 0.50	0.15 0.28 0.46	0.13 0.25 0.40	0.11 0.21 0.34	0.10 0.17 0.28	0.08 0.13 0.21	0.08 0.11 0.17	0.05 0.08 0.13	0.04 0.06 0.11	0.03 0.05 0.09	0.03 0.04 0.07	0.03 0.04 0.06	0.02 0.03 0.05	0.02 0.03 0.04	0.01 0.02 0.03	0.01 0.02 0.03
10	0.16 0.26 0.43	0.15 0.26 0.42	0.16 0.26 0.42	0.15 0.26 0.43	0.16 0.25 0.42	0.14 0.25 0.41	0.13 0.24 0.39	0.13 0.23 0.36	0.11 0.20 0.32	0.09 0.17 0.27	0.08 0.14 0.23	0.06 0.11 0.18	0.05 0.09 0.14	0.04 0.07 0.12	0.04 0.06 0.09	0.03 0.05 0.07	0.02 0.04 0.06	0.02 0.03 0.05	0.03 0.03 0.04	0.03 0.02 0.04	0.01 0.02 0.03
11	0.13 0.22 0.35	0.13 0.22 0.35	0.13 0.22 0.35	0.12 0.22 0.35	0.12 0.21 0.35	0.12 0.21 0.35	0.11 0.20 0.33	0.10 0.19 0.31	0.10 0.16 0.29	0.09 0.16 0.26	0.07 0.14 0.23	0.06 0.12 0.19	0.08 0.09 0.16	0.04 0.08 0.13	0.04 0.08 0.11	0.03 0.05 0.09	0.03 0.04 0.07	0.02 0.03 0.06	0.03 0.03 0.05	0.02 0.03 0.04	0.01 0.02 0.03
12	0.11 0.18 0.30	0.11 0.18 0.30	0.11 0.18 0.29	0.10 0.16 0.29	0.10 0.18 0.29	0.10 0.18 0.29	0.10 0.17 0.28	0.09 0.17 0.28	0.09 0.15 0.26	0.08 0.14 0.24	0.07 0.13 0.21	0.08 0.11 0.18	0.08 0.10 0.16	0.05 0.08 0.13	0.04 0.06 0.11	0.03 0.06 0.09	0.03 0.04 0.07	0.02 0.04 0.07	0.02 0.03 0.05	0.02 0.03 0.06	0.01 0.02 0.04
13	0.09 0.16 0.25	0.09 0.16 0.26	0.09 0.15 0.26	0.09 0.16 0.25	0.09 0.16 0.25	0.09 0.15 0.26	0.08 0.15 0.25	0.08 0.14 0.24	0.08 0.14 0.23	0.07 0.13 0.21	0.07 0.13 0.19	0.06 0.11 0.18	0.05 0.10 0.15	0.05 0.08 0.14	0.04 0.07 0.13	0.03 0.06 0.10	0.03 0.06 0.08	0.02 0.04 0.07	0.02 0.03 0.06	0.02 0.03 0.05	0.02 0.03 0.05
14	0.08 0.13 0.22	0.08 0.13 0.23	0.08 0.13 0.22	0.08 0.13 0.22	0.08 0.13 0.22	0.08 0.13 0.22	0.07 0.13 0.22	0.07 0.13 0.21	0.07 0.12 0.20	0.06 0.12 0.19	0.06 0.11 0.18	0.06 0.10 0.17	0.05 0.09 0.15	0.04 0.08 0.14	0.04 0.07 0.12	0.03 0.06 0.10	0.03 0.05 0.08	0.03 0.04 0.07	0.02 0.03 0.06	0.02 0.03 0.05	0.02 0.03 0.05
15	0.07 0.12 0.19	0.07 0.12 0.19	0.07 0.12 0.19	0.07 0.12 0.19	0.07 0.12 0.19	0.07 0.11 0.19	0.07 0.11 0.19	0.06 0.11 0.19	0.06 0.11 0.18	0.06 0.11 0.17	0.08 0.10 0.16	0.06 0.10 0.16	0.05 0.09 0.14	0.04 0.08 0.13	0.04 0.07 0.13	0.03 0.06 0.10	0.03 0.06 0.09	0.03 0.05 0.07	0.02 0.04 0.06	0.02 0.03 0.06	0.02 0.03 0.05
16	0.06 0.10 0.17	0.06 0.10 0.17	0.06 0.10 0.17	0.06 0.10 0.17	0.06 0.10 0.17	0.06 0.10 0.17	0.05 0.10 0.17	0.06 0.10 0.17	0.05 0.10 0.16	0.06 0.09 0.16	0.05 0.09 0.15	0.05 0.09 0.14	0.04 0.08 0.13	0.04 0.08 0.12	0.04 0.07 0.11	0.03 0.06 0.10	0.03 0.06 0.09	0.03 0.05 0.08	0.02 0.04 0.06	0.02 0.04 0.06	0.02 0.03 0.05
17	0.05 0.09 0.15	0.05 0.09 0.15	0.05 0.09 0.16	0.05 0.09 0.16	0.05 0.09 0.16	0.05 0.09 0.16	0.05 0.09 0.16	0.05 0.09 0.15	0.05 0.09 0.14	0.06 0.08 0.14	0.06 0.08 0.14	0.04 0.08 0.13	0.04 0.08 0.12	0.04 0.07 0.12	0.04 0.06 0.11	0.03 0.06 0.10	0.03 0.06 0.09	0.03 0.05 0.08	0.02 0.04 0.07	0.02 0.04 0.08	0.02 0.03 0.05
18	0.05 0.08 0.13	0.05 0.08 0.13	0.06 0.08 0.13	0.05 0.08 0.13	0.06 0.08 0.13	0.06 0.08 0.13	0.05 0.08 0.13	0.04 0.08 0.13	0.04 0.08 0.13	0.04 0.08 0.13	0.04 0.07 0.13	0.04 0.07 0.12	0.04 0.07 0.11	0.04 0.07 0.11	0.03 0.06 0.10	0.03 0.06 0.08	0.03 0.06 0.08	0.03 0.06 0.08	0.02 0.04 0.07	0.02 0.04 0.06	0.02 0.03 0.05
19	0.04 0.07 0.12	0.04 0.07 0.13	0.04 0.07 0.12	0.04 0.07 0.12	0.04 0.07 0.12	0.04 0.07 0.12	0.04 0.07 0.12	0.04 0.07 0.12	0.04 0.07 0.12	0.04 0.07 0.12	0.04 0.07 0.11	0.04 0.07 0.11	0.04 0.06 0.11	0.03 0.06 0.10	0.03 0.06 0.09	0.03 0.06 0.09	0.03 0.05 0.08	0.03 0.05 0.08	0.02 0.04 0.07	0.03 0.04 0.08	0.02 0.03 0.06
20	0.04 0.07 0.11	0.04 0.07 0.11	0.04 0.07 0.11	0.04 0.07 0.11	0.04 0.07 0.11	0.04 0.07 0.11	0.04 0.07 0.11	0.04 0.06 0.11	0.04 0.06 0.11	0.04 0.06 0.11	0.03 0.06 0.10	0.03 0.06 0.10	0.03 0.06 0.10	0.03 0.06 0.09	0.03 0.06 0.09	0.03 0.05 0.06	0.03 0.06 0.08	0.02 0.05 0.08	0.02 0.04 0.07	0.02 0.04 0.07	0.02 0.04 0.06

NOTE—This table is based on the following efficiencies: 25-watt, 1.33 w. p. c.; 40-watt, 1.25 w. p. c.; 60-watt, 1.20 w. p. c.

TABLE No. 4

Showing Illumination in Foot-Candles from "MAZDA" 100, 150, and 250-Watt, 100-125 Volt, Bowl-Frosted Lamps, equipped respectively with Holophane Extensive Clear High Efficiency Reflectors Nos. 106280, 106285, and 106290. (Top number in each space corresponds to the 100-watt, middle number to the 150-watt, and bottom number to the 250-watt Unit.)

Horizontal distance of point investigated in feet from point directly beneath Unit.

Height of Unit in feet above plane to be illuminated.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
4	4.69 8.00 14.80	4.67 7.64 14.17	4.23 6.80 12.80	3.31 5.95 11.46	2.18 3.94 7.78	1.32 2.18 4.40	0.71 1.29 2.48	0.43 0.79 1.45	0.29 0.51 0.88	0.19 0.35 0.58	0.14 0.25 0.40	0.12 0.18 0.29	0.10 0.14 0.22	0.08 0.11 0.17	0.06 0.09 0.14	0.05 0.07 0.11	0.04 0.06 0.09	0.03 0.05 0.07	0.03 0.04 0.06	0.02 0.03 0.05	0.02 0.03 0.05
5	3.00 5.12 9.49	2.96 4.90 9.21	2.82 4.51 8.66	2.49 4.16 7.81	1.95 3.58 7.05	1.40 2.52 4.98	0.87 1.60 3.20	0.57 1.01 1.99	0.40 0.67 1.27	0.26 0.47 0.83	0.19 0.33 0.66	0.14 0.24 0.40	0.11 0.18 0.30	0.10 0.14 0.23	0.07 0.11 0.18	0.06 0.09 0.14	0.05 0.07 0.12	0.04 0.06 0.10	0.03 0.05 0.08	0.03 0.04 0.07	0.03 0.04 0.06
6	2.08 3.66 6.59	2.06 3.45 6.44	2.00 3.22 6.09	1.88 3.03 6.69	1.60 2.80 5.26	1.30 2.37 4.70	0.91 1.75 3.46	0.67 1.20 2.40	0.45 0.81 1.61	0.32 0.57 1.10	0.22 0.42 0.77	0.17 0.30 0.54	0.13 0.23 0.39	0.11 0.18 0.30	0.08 0.14 0.23	0.08 0.11 0.18	0.06 0.09 0.14	0.06 0.07 0.12	0.04 0.06 0.10	0.03 0.06 0.08	0.03 0.04 0.07
7	1.63 2.62 4.84	1.61 2.65 4.75	1.47 2.43 4.55	1.44 2.28 4.35	1.30 2.15 4.04	1.12 1.98 3.76	0.90 1.68 3.32	0.71 1.28 2.64	0.53 0.94 1.84	0.37 0.67 1.33	0.26 0.49 0.95	0.20 0.37 0.68	0.16 0.28 0.61	0.12 0.22 0.38	0.09 0.17 0.29	0.07 0.14 0.22	0.08 0.11 0.18	0.08 0.09 0.15	0.05 0.08 0.12	0.04 0.06 0.10	0.03 0.06 0.09
8	1.17 2.00 3.71	1.16 1.95 3.68	1.16 1.88 3.64	1.11 1.78 3.39	1.03 1.70 3.20	0.94 1.60 3.01	0.83 1.49 2.86	0.70 1.25 2.43	0.55 0.98 1.94	0.40 0.75 1.47	0.31 0.65 1.11	0.24 0.43 0.82	0.18 0.32 0.62	0.14 0.26 0.47	0.11 0.20 0.36	0.09 0.16 0.28	0.07 0.13 0.22	0.06 0.11 0.18	0.06 0.09 0.14	0.04 0.07 0.12	0.04 0.06 0.10
9	0.93 1.68 2.93	0.83 1.65 2.90	0.91 1.49 2.82	0.89 1.43 2.71	0.86 1.37 2.69	0.80 1.30 2.46	0.73 1.25 2.34	0.63 1.13 2.22	0.52 0.98 1.90	0.43 0.78 1.54	0.33 0.61 1.20	0.27 0.48 0.94	0.19 0.36 0.72	0.16 0.29 0.56	0.12 0.23 0.43	0.10 0.18 0.34	0.09 0.15 0.27	0.07 0.12 0.21	0.08 0.10 0.17	0.06 0.09 0.14	0.04 0.07 0.12
10	0.76 1.28 2.37	0.76 1.26 2.34	0.74 1.22 2.30	0.73 1.18 2.25	0.71 1.13 2.14	0.67 1.09 2.02	0.62 1.04 1.96	0.57 0.98 1.87	0.49 0.89 1.76	0.42 0.77 1.61	0.35 0.63 1.24	0.28 0.61 1.00	0.23 0.40 0.80	0.18 0.32 0.63	0.14 0.25 0.50	0.11 0.21 0.40	0.09 0.17 0.32	0.08 0.14 0.26	0.06 0.12 0.21	0.05 0.10 0.17	0.05 0.08 0.14
11	0.62 1.06 1.96	0.62 1.04 1.94	0.61 1.02 1.91	0.60 0.99 1.85	0.59 0.95 1.80	0.56 0.91 1.72	0.63 0.88 1.65	0.60 0.84 1.58	0.46 0.79 1.53	0.40 0.72 1.42	0.35 0.63 1.23	0.29 0.52 1.03	0.23 0.43 0.84	0.20 0.34 0.69	0.16 0.28 0.66	0.13 0.23 0.45	0.11 0.19 0.36	0.09 0.16 0.30	0.07 0.13 0.24	0.06 0.11 0.20	0.05 0.09 0.17
12	0.62 0.89 1.64	0.52 0.88 1.63	0.51 0.86 1.61	0.51 0.84 1.67	0.50 0.81 1.53	0.48 0.78 1.47	0.46 0.75 1.42	0.44 0.72 1.37	0.40 0.70 1.32	0.37 0.66 1.27	0.32 0.69 1.17	0.28 0.52 1.01	0.24 0.44 0.87	0.20 0.36 0.73	0.16 0.30 0.60	0.14 0.24 0.49	0.11 0.20 0.40	0.10 0.17 0.33	0.08 0.14 0.28	0.07 0.12 0.23	0.05 0.10 0.19
13	0.44 0.76 1.40	0.44 0.76 1.39	0.44 0.74 1.37	0.44 0.72 1.36	0.43 0.70 1.31	0.42 0.67 1.27	0.40 0.65 1.23	0.38 0.63 1.19	0.36 0.61 1.14	0.34 0.59 1.11	0.30 0.55 1.07	0.28 0.49 0.98	0.24 0.43 0.86	0.21 0.37 0.74	0.18 0.33 0.63	0.15 0.28 0.62	0.13 0.23 0.44	0.11 0.19 0.36	0.09 0.16 0.30	0.08 0.13 0.25	0.07 0.12 0.22
14	0.38 0.65 1.21	0.38 0.65 1.20	0.38 0.64 1.19	0.38 0.62 1.17	0.37 0.61 1.14	0.36 0.59 1.11	0.36 0.57 1.08	0.34 0.55 1.04	0.32 0 64 1.01	0.31 0.52 0.97	0.28 0.50 0.95	0.26 0.46 0.91	0.23 0.42 0.83	0.20 0.37 0.73	0.18 0.32 0.63	0.16 0.28 0.54	0.13 0.24 0.48	0.11 0.20 0.39	0.09 0.17 0.83	0.08 0.14 0.28	0.07 0.12 0.24
15	0.33 0.67 1.05	0.33 0.57 1.06	0.38 0.56 1.04	0.33 0.55 1.02	0.32 0.53 1.00	0.32 0.52 0.98	0.31 0.50 0.96	0.30 0.49 0.92	0.29 0.48 0.89	0.28 0.46 0.87	0 26 0.45 0.84	0.24 0.43 0.82	0.22 0.40 0.79	0.20 0.36 0.71	0.18 0.32 0.63	0.16 0.28 0.65	0.14 0.24 0.48	0.12 0.21 0.41	0.10 0.18 0.36	0.09 0.15 0.31	0.08 0.13 0.26
16	0.29 0.60 0.93	0.29 0.60 0.92	0.29 0.49 0.91	0.29 0.48 0.90	0.29 0.47 0.89	0.28 0.46 0.87	0.28 0.45 0.86	0.27 0.43 0.82	0.26 0.42 0.80	0.25 0.41 0.77	0.24 0.40 0.75	0.22 0.39 0.73	0.21 0.37 0.72	0.19 0.34 0.68	0.17 0.31 0.62	0.16 0.38 0.55	0.14 0.26 0.49	0.12 0.23 0.42	0.10 0.19 0.37	0.09 0.16 0.32	0.08 0.14 0.28
17	0.26 0.44 0.82	0.26 0.44 0.82	0.26 0.43 0.81	0.26 0.43 0.80	0.26 0.42 0.79	0.25 0.41 0.77	0.25 0.40 0.75	0.24 0.39 0.73	0.24 0.38 0.71	0.23 0.37 0.70	0.22 0.36 0.68	0.21 0.35 0.66	0.20 0.34 0.65	0.18 0.32 0.63	0.16 0.30 0.59	0.15 0.27 0.54	0.14 0.25 0.49	0.12 0.22 0.43	0.10 0.19 0.38	0.09 0.17 0.33	0.08 0.15 0.29
18	0.23 0.39 0.73	0.23 0.39 0.73	0.23 0.39 0.73	0.23 -0.38 0.72	0.23 0.37 0.70	0.23 0.37 0.69	0.22 0.36 0.68	0.22 0.35 0.66	0.22 0.34 0.65	0.21 0.34 0.63	0.20 0.33 0.61	0.18 0.32 0.60	0.18 0.31 0.69	0.17 0.30 0.58	0.16 0.28 0.66	0.14 0.26 0.52	0.13 0.24 0.48	0.12 0.22 0.43	0.11 0.19 0.38	0.09 0.17 0.34	0.09 0.15 0.30
19	0.21 0.36 0.66	0.21 0.35 0.66	0.21 0.35 0.65	0.21 0.34 0.64	0.21 0.34 0.63	0.20 0.33 0.62	0.20 0.32 0.61	0.20 0.32 0.60	0.19 0.31 0.68	0.19 0.30 0.67	0.18 0.30 0.66	0.18 0.28 0.65	0.17 0.28 0.53	0.16 0.27 0.52	0.15 0.26 0.51	0.14 0.25 0.49	0.13 0.23 0.46	0.12 0.22 0.42	0.11 0.20 0.39	0.10 0.17 0.35	0.09 0.16 0.30
20	0.19 0.38 0.59	0.19 0.32 0.59	0.19 0.32 0.59	0.19 0.31 0.58	0.19 0.31 0.58	0.18 0 30 0.67	0.18 0.29 0.66	0.18 0.29 0.55	0.18 0.28 0.63	0.17 0.27 0.62	0.17 0.27 0.61	0.16 0.26 0.60	0.16 0.26 0.49	0.15 0.25 0.48	0.14 0.24 0.47	0.13 0.24 0.46	0.12 0.22 0.44	0.12 0.21 0.41	0.11 0.19 0.38	0.10 0.17 0.34	0.09 0.16 0.31

NOTE—This table is based on the following efficiencies : 100-watt, 1.20 w.p.c.; 150-watt, 1.20 w.p.c.; 250-watt, 1.15 w.p.c.

TABLE No. 5

Horizontal distance of point investigated in feet from point directly beneath Unit

Height of Unit in feet above plane to be Illuminated.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
4	1.94	1.77	1.34	0.87	0.51	0.30	0.19	0.11	0.07	0.05	0.04	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	..
	3.69	2.73	2.15	1.46	0.77	0.44	0.25	0.15	0.10	0.07	0.05	0.04	0.03	0.03	0.02	0.02	0.02	0.01	0.01	0.01	0.01
	5.40	4.78	3.64	2.39	1.22	0.70	0.38	0.22	0.14	0.10	0.07	0.06	0.04	0.04	0.03	0.03	0.03	0.02	0.01	0.01	0.01
5	1.24	1.17	0.97	0.73	0.50	0.33	0.22	0.14	0.10	0.07	0.05	0.04	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01
	1.96	1.81	1.56	1.21	0.83	0.50	0.30	0.20	0.14	0.09	0.06	0.05	0.04	0.03	0.02	0.02	0.02	0.01	0.01	0.01	0.01
	3.46	3.20	2.69	2.06	1.33	0.78	0.48	0.31	0.20	0.12	0.09	0.07	0.05	0.04	0.03	0.03	0.02	0.02	0.02	0.01	0.01
6	0.87	0.83	0.73	0.59	0.45	0.33	0.23	0.16	0.11	0.08	0.06	0.04	0.03	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01
	1.36	1.29	1.15	0.95	0.71	0.51	0.35	0.24	0.16	0.11	0.08	0.06	0.04	0.04	0.03	0.03	0.02	0.02	0.02	0.01	0.01
	2.40	2.26	1.98	1.62	1.23	0.87	0.64	0.36	0.26	0.17	0.11	0.09	0.06	0.05	0.04	0.03	0.03	0.03	0.02	0.03	0.01
7	0.64	0.62	0.56	0.48	0.39	0.30	0.23	0.17	0.12	0.09	0.07	0.05	0.04	0.03	0.02	0.02	0.02	0.01	0.01	0.01	0.01
	1.00	0.96	0.89	0.76	0.64	0.50	0.36	0.25	0.20	0.13	0.09	0.07	0.06	0.04	0.03	0.02	0.02	0.02	0.02	0.01	0.01
	1.76	1.69	1.56	1.29	1.07	0.81	0.69	0.40	0.29	0.19	0.14	0.10	0.08	0.06	0.05	0.04	0.03	0.03	0.02	0.02	0.02
8	0.49	0.48	0.44	0.38	0.34	0.27	0.21	0.17	0.13	0.10	0.08	0.06	0.05	0.04	0.03	0.02	0.02	0.02	0.01	0.01	0.01
	0.77	0.75	0.70	0.62	0.54	0.43	0.36	0.28	0.21	0.11	0.09	0.09	0.06	0.05	0.04	0.03	0.03	0.02	0.02	0.02	0.01
	1.35	1.31	1.22	1.07	0.92	0.74	0.59	0.46	0.33	0.23	0.17	0.13	0.09	0.07	0.06	0.05	0.04	0.03	0.03	0.02	0.02
9	0.38	0.37	0.36	0.33	0.28	0.24	0.19	0.16	0.13	0.10	0.08	0.06	0.05	0.04	0.03	0.03	0.02	0.02	0.01	0.01	0.01
	0.60	0.59	0.56	0.51	0.46	0.40	0.33	0.27	0.21	0.17	0.12	0.09	0.07	0.06	0.04	0.03	0.03	0.02	0.02	0.02	0.02
	1.08	1.04	0.98	0.88	0.79	0.68	0.55	0.44	0.33	0.26	0.18	0.15	0.10	0.08	0.07	0.05	0.04	0.03	0.03	0.02	0.02
10	0.31	0.31	0.29	0.27	0.25	0.21	0.18	0.15	0.14	0.10	0.08	0.07	0.05	0.04	0.04	0.03	0.02	0.02	0.02	0.01	0.01
	0.49	0.48	0.46	0.44	0.39	0.35	0.30	0.25	0.21	0.17	0.13	0.10	0.08	0.06	0.05	0.04	0.03	0.03	0.02	0.02	0.02
	0.87	0.84	0.81	0.74	0.68	0.59	0.51	0.41	0.33	0.27	0.21	0.16	0.12	0.10	0.08	0.06	0.05	0.04	0.03	0.03	0.02
11	0.26	0.26	0.25	0.23	0.21	0.19	0.17	0.14	0.12	0.10	0.08	0.07	0.06	0.05	0.04	0.03	0.03	0.02	0.02	0.02	0.01
	0.40	0.40	0.39	0.37	0.34	0.30	0.27	0.23	0.20	0.17	0.14	0.11	0.08	0.07	0.06	0.05	0.04	0.03	0.02	0.02	0.02
	0.67	0.65	0.63	0.59	0.53	0.48	0.39	0.33	0.27	0.22	0.17	0.13	0.11	0.09	0.07	0.06	0.04	0.04	0.03	0.03	0.02
12	0.21	0.21	0.20	0.19	0.19	0.17	0.15	0.13	0.11	0.10	0.08	0.07	0.06	0.05	0.04	0.03	0.03	0.02	0.02	0.02	0.01
	0.34	0.34	0.33	0.31	0.29	0.27	0.24	0.22	0.19	0.16	0.13	0.11	0.09	0.07	0.06	0.05	0.04	0.03	0.03	0.03	0.02
	0.60	0.59	0.57	0.54	0.50	0.46	0.40	0.36	0.31	0.26	0.21	0.17	0.15	0.11	0.09	0.07	0.06	0.06	0.04	0.04	0.03
13	0.19	0.19	0.18	0.17	0.16	0.15	0.13	0.12	0.10	0.09	0.08	0.07	0.06	0.05	0.04	0.04	0.03	0.03	0.02	0.02	0.02
	0.29	0.29	0.28	0.27	0.25	0.24	0.22	0.19	0.17	0.15	0.13	0.11	0.09	0.08	0.07	0.06	0.04	0.04	0.03	0.03	0.02
	0.51	0.50	0.49	0.47	0.44	0.41	0.37	0.32	0.29	0.25	0.21	0.18	0.15	0.12	0.10	0.08	0.07	0.06	0.05	0.04	0.04
14	0.16	0.16	0.15	0.15	0.14	0.13	0.12	0.11	0.10	0.09	0.08	0.07	0.06	0.05	0.04	0.04	0.03	0.03	0.02	0.02	0.02
	0.25	0.25	0.24	0.23	0.22	0.21	0.20	0.18	0.16	0.14	0.12	0.11	0.09	0.08	0.07	0.06	0.05	0.04	0.03	0.03	0.03
	0.44	0.43	0.42	0.41	0.38	0.36	0.33	0.30	0.27	0.24	0.20	0.18	0.15	0.13	0.11	0.09	0.07	0.06	0.05	0.04	0.04
15	0.14	0.14	0.13	0.13	0.12	0.11	0.10	0.10	0.08	0.08	0.07	0.06	0.06	0.05	0.04	0.04	0.03	0.02	0.02	0.02	0.02
	0.22	0.21	0.21	0.21	0.20	0.18	0.17	0.16	0.15	0.13	0.12	0.11	0.09	0.08	0.07	0.06	0.05	0.04	0.03	0.03	0.03
	0.38	0.36	0.37	0.36	0.34	0.32	0.30	0.27	0.25	0.23	0.20	0.18	0.15	0.13	0.11	0.09	0.08	0.07	0.05	0.05	0.04
16	0.12	0.12	0.12	0.12	0.11	0.10	0.10	0.09	0.08	0.08	0.07	0.06	0.05	0.05	0.04	0.04	0.03	0.03	0.02	0.02	0.02
	0.19	0.19	0.19	0.18	0.17	0.16	0.16	0.15	0.14	0.13	0.11	0.10	0.09	0.08	0.07	0.06	0.05	0.05	0.04	0.03	0.03
	0.34	0.33	0.32	0.31	0.30	0.28	0.27	0.25	0.23	0.21	0.19	0.16	0.15	0.13	0.11	0.10	0.08	0.07	0.06	0.05	0.04
17	0.11	0.11	0.11	0.10	0.10	0.09	0.09	0.08	0.08	0.07	0.06	0.06	0.05	0.05	0.04	0.04	0.03	0.03	0.03	0.02	0.02
	0.17	0.17	0.17	0.16	0.16	0.15	0.14	0.13	0.13	0.12	0.11	0.10	0.09	0.07	0.07	0.06	0.05	0.05	0.04	0.03	0.03
	0.30	0.29	0.29	0.28	0.27	0.26	0.24	0.23	0.22	0.20	0.18	0.16	0.14	0.12	0.11	0.10	0.09	0.07	0.06	0.05	0.05
18	0.10	0.10	0.09	0.09	0.09	0.09	0.08	0.08	0.07	0.07	0.06	0.05	0.05	0.05	0.04	0.04	0.03	0.03	0.03	0.02	0.02
	0.15	0.15	0.15	0.14	0.14	0.13	0.13	0.12	0.12	0.11	0.10	0.09	0.08	0.07	0.07	0.06	0.05	0.05	0.04	0.04	0.03
	0.27	0.27	0.26	0.25	0.24	0.23	0.22	0.21	0.20	0.18	0.17	0.15	0.14	0.12	0.11	0.10	0.08	0.08	0.06	0.06	0.05
19	0.09	0.09	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.06	0.06	0.05	0.05	0.04	0.04	0.04	0.03	0.03	0.02	0.02	0.02
	0.14	0.14	0.13	0.13	0.13	0.12	0.12	0.11	0.11	0.10	0.09	0.09	0.08	0.07	0.06	0.06	0.05	0.05	0.04	0.04	0.03
	0.24	0.24	0.24	0.23	0.22	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.13	0.12	0.10	0.10	0.09	0.08	0.07	0.06	0.05
20	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.06	0.06	0.06	0.05	0.05	0.05	0.04	0.04	0.03	0.03	0.03	0.02	0.02	0.02
	0.12	0.12	0.12	0.12	0.11	0.11	0.11	0.10	0.10	0.09	0.09	0.08	0.08	0.07	0.06	0.06	0.05	0.05	0.04	0.04	0.03
	0.22	0.22	0.21	0.21	0.20	0.19	0.18	0.17	0.17	0.16	0.15	0.14	0.13	0.12	0.10	0.09	0.08	0.08	0.07	0.06	0.05

NOTE—This table is based on the following efficiencies: 25-watt, 1.33 w.p.c.; 40-watt, 1.25 w.p.c.; 60-watt, 1.20 w.p.c.

Showing Illumination in Foot-Candles from "MAZDA" 25, 40 and 60-Watt, 100-125 Volt, Bowl-Frosted Lamps, equipped with Holophane Intensive Clear High Efficiency Reflectors Nos. 106125, 106130, and 106150. (Top number in each space corresponds to the 25-watt, middle number to the 40-watt, and bottom number to the 60-watt Unit.)

TABLE No. 6

Showing Illumination in Foot-Candles from "MAZDA" 100, 150, and 250-Watt, 100-125 Volt, Bowl-Frosted Lamps, equipped respectively with Holophane Intensive Clear High Efficiency Reflectors Nos. 106180, 106185, and 106190. (Top number in each space corresponds to the 100-watt, middle number to the 150-watt, and bottom number to the 250-watt Unit.)

Horizontal distance of point investigated in feet from point directly beneath Unit.

Height of Unit in feet above plane to be illuminated.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
4	7.68 13.25 23.12	6.90 12.10 21.11	5.25 9.21 16.03	3.47 5.89 10.11	1.92 3.45 5.96	1.08 1.93 3.43	0.65 1.11 1.98	0.36 0.69 1.21	0.23 0.45 0.79	0.16 0.31 0.54	0.11 0.22 0.38	0.10 0.16 0.28	0.07 0.13 0.21	0.06 0.10 0.16	0.05 0.08 0.13	0.04 0.06 0.10	0.03 0.05 0.09	0.03 0.04 0.07	0.02 0.04 0.06	0.02 0.03 0.05	0.02 0.03 0.04
5	4.92 8.49 14.80	4.58 8.00 13.95	3.88 6.76 11.72	2.90 5.04 8.69	1.99 3.39 5.86	1.22 2.20 3.82	0.74 1.39 2.46	0.47 0.88 1.57	0.30 0.58 1.04	0.20 0.40 0.71	0.15 0.29 0.51	0.11 0.21 0.36	0.08 0.16 0.28	0.07 0.13 0.21	0.05 0.10 0.17	0.04 0.08 0.14	0.04 0.07 0.11	0.03 0.05 0.09	0.03 0.05 0.08	0.02 0.04 0.06	0.02 0.03 0.05
6	3.41 5.88 10.28	3.24 5.66 9.89	2.87 5.03 8.78	2.34 4.09 7.11	1.76 3.09 5.29	1.30 2.20 3.79	0.84 1.53 2.58	0.57 1.03 1.84	0.38 0.71 1.26	0.25 0.48 0.88	0.18 0.35 0.83	0.14 0.26 0.48	0.10 0.20 0.35	0.08 0.16 0.27	0.07 0.12 0.21	0.05 0.10 0.17	0.04 0.08 0.14	0.04 0.07 0.11	0.03 0.06 0.10	0.03 0.05 0.06	0.02 0.04 0.07
7	2.51 4.33 7.53	2.40 4.20 7.32	2.24 3.84 6.70	1.93 3.33 5.79	1.63 2.70 4.68	1.19 2.06 3.65	0.89 1.64 2.57	0.65 1.13 1.95	0.46 0.81 1.42	0.31 0.58 1.04	0.21 0.42 0.75	0.16 0.31 0.66	0.13 0.24 0.43	0.10 0.18 0.33	0.08 0.15 0.26	0.06 0.12 0.21	0.05 0.10 0.17	0.04 0.08 0.14	0.04 0.07 0.12	0.03 0.06 0.10	0.03 0.05 0.08
8	1.92 3.32 5.78	1.88 3.24 5.65	1.74 3.02 5.27	1.56 2.71 4.72	1.33 2.30 4.00	1.08 1.88 3.23	0.86 1.47 2.52	0.68 1.13 1.96	0.52 0.86 1.49	0.35 0.64 1.13	0.26 0.48 0.86	0.20 0.37 0.65	0.15 0.28 0.50	0.11 0.22 0.39	0.09 0.17 0.30	0.08 0.14 0.24	0.06 0.11 0.20	0.05 0.09 0.16	0.04 0.08 0.14	0.03 0.06 0.11	0.03 0.06 0.10
9	1.50 2.62 4.57	1.48 2.57 4.48	1.39 2.43 4.25	1.27 2.23 3.90	1.13 1.98 3.43	0.96 1.67 2.89	0.78 1.37 2.36	0.65 1.09 1.89	0.51 0.87 1.50	0.40 0.68 1.18	0.30 0.53 0.92	0.23 0.41 0.72	0.16 0.32 0.56	0.13 0.25 0.44	0.10 0.20 0.35	0.08 0.16 0.28	0.07 0.13 0.23	0.05 0.11 0.19	0.04 0.09 0.16	0.04 0.07 0.13	0.03 0.06 0.11
10	1.23 2.12 3.70	1.21 2.09 3.64	1.15 2.00 3.49	1.06 1.86 3.26	0.97 1.69 2.94	0.84 1.48 2.56	0.72 1.26 2.17	0.61 1.04 1.79	0.48 0.85 1.46	0.41 0.69 1.18	0.33 0.55 0.96	0.25 0.44 0.77	0.19 0.35 0.61	0.15 0.28 0.49	0.12 0.22 0.39	0.09 0.15 0.32	0.07 0.15 0.26	0.08 0.12 0.21	0.05 0.10 0.18	0.04 0.08 0.15	0.04 0.07 0.13
11	1.02 1.75 3.06	1.00 1.73 3.02	0.95 1.87 2.91	0.91 1.57 2.74	0.83 1.45 2.53	0.74 1.30 2.26	0.64 1.14 1.93	0.56 0.97 1.67	0.48 0.81 1.40	0.41 0.67 1.16	0.34 0.56 0.98	0.27 0.46 0.79	0.21 0.37 0.64	0.17 0.30 0.53	0.14 0.24 0.43	0.11 0.20 0.35	0.09 0.16 0.29	0.07 0.13 0.24	0.06 0.11 0.20	0.05 0.09 0.17	0.04 0.08 0.14
12	0.85 1.47 2.67	0.84 1.46 2.54	0.81 1.42 2.47	0.77 1.34 2.34	0.72 1.26 2.19	0.66 1.15 1.99	0.68 1.02 1.78	0.62 0.90 1.65	0.45 0.77 1.32	0.38 0.66 1.12	0.32 0.55 0.95	0.28 0.46 0.79	0.23 0.38 0.66	0.18 0.31 0.55	0.14 0.26 0.46	0.11 0.21 0.38	0.09 0.18 0.32	0.08 0.15 0.26	0.07 0.12 0.22	0.06 0.10 0.19	0.04 0.09 0.16
13	0.73 1.25 2.18	0.72 1.24 2.17	0.70 1.21 2.12	0.67 1.16 2.02	0.63 1.10 1.91	0.59 1.02 1.77	0.53 0.93 1.62	0.47 0.82 1.43	0.41 0.72 1.25	0.36 0.63 1.07	0.31 0.53 0.92	0.27 0.45 0.78	0.23 0.39 0.66	0.20 0.33 0.56	0.16 0.27 0.48	0.13 0.23 0.40	0.11 0.19 0.34	0.09 0.16 0.29	0.07 0.14 0.24	0.06 0.11 0.20	0.06 0.10 0.17
14	0.63 1.08 1.89	0.62 1.07 1.87	0.61 1.05 1.83	0.58 1.01 1.77	0.56 0.96 1.68	0.51 0.90 1.67	0.47 0.83 1.44	0.43 0.75 1.31	0.38 0.87 1.17	0.34 0.59 1.02	0.30 0.51 0.89	0.27 0.44 0.77	0.22 0.39 0.66	0.19 0.33 0.57	0.17 0.28 0.49	0.14 0.24 0.41	0.12 0.20 0.36	0.09 0.17 0.30	0.08 0.15 0.28	0.07 0.12 0.22	0.06 0.11 0.19
15	0.55 0.94 1.64	0.54 0.94 1.64	0.53 0.92 1.60	0.51 0.87 1.55	0.49 0.85 1.48	0.47 0.81 1.41	0.43 0.75 1.30	0.40 0.69 1.20	0.36 0.63 1.08	0.32 0.56 0.96	0.28 0.49 0.86	0.26 0.43 0.75	0.22 0.38 0.65	0.19 0.33 0.66	0.17 0.29 0.49	0.15 0.24 0.42	0.12 0.21 0.37	0.10 0.18 0.31	0.08 0.15 0.27	0.08 0.13 0.24	0.07 0.11 0.20
16	0.48 0.83 1.45	0.48 0.82 1.44	0.47 0.81 1.41	0.45 0.79 1.37	0.43 0.78 1.32	0.41 0.72 1.25	0.39 0.68 1.18	0.36 0.63 1.12	0.33 0.58 1.00	0.30 0.52 0.91	0.27 0.47 0.81	0.24 0.42 0.72	0.21 0.37 0.63	0.19 0.32 0.56	0.17 0.28 0.49	0.15 0.25 0.43	0.13 0.22 0.37	0.11 0.19 0.32	0.09 0.16 0.28	0.08 0.14 0.25	0.07 0.13 0.21
17	0.42 0.73 1.28	0.42 0.73 1.27	0.42 0.72 1.25	0.41 0.70 1.22	0.39 0.68 1.18	0.37 0.65 1.13	0.35 0.61 1.07	0.33 0.56 1.00	0.31 0.53 0.92	0.28 0.49 0.85	0.25 0.44 0.77	0.23 0.40 0.69	0.21 0.36 0.61	0.18 0.32 0.55	0.16 0.28 0.48	0.15 0.25 0.43	0.13 0.22 0.38	0.11 0.19 0.33	0.09 0.17 0.29	0.08 0.15 0.26	0.07 0.13 0.22
18	0.38 0.66 1.14	0.38 0.65 1.14	0.37 0.64 1.13	0.36 0.63 1.10	0.35 0.61 1.06	0.33 0.59 1.03	0.32 0.56 0.98	0.30 0.53 0.92	0.28 0.50 0.86	0.26 0.48 0.79	0.24 0.42 0.72	0.22 0.38 0.66	0.20 0.34 0.59	0.18 0.31 0.53	0.16 0.27 0.47	0.14 0.25 0.42	0.13 0.22 0.38	0.12 0.19 0.33	0.10 0.17 0.29	0.09 0.16 0.26	0.08 0.13 0.23
19	0.34 0.59 1.02	0.34 0.58 1.02	0.33 0.58 1.01	0.33 0.57 0.99	0.32 0.55 0.96	0.31 0.53 0.93	0.29 0.51 0.89	0.27 0.48 0.84	0.26 0.46 0.79	0.24 0.43 0.74	0.22 0.39 0.68	0.21 0.36 0.63	0.19 0.33 0.56	0.17 0.30 0.51	0.15 0.27 0.46	0.14 0.24 0.41	0.13 0.22 0.37	0.11 0.19 0.33	0.10 0.17 0.30	0.09 0.15 0.26	0.08 0.13 0.23
20	0.31 0.53 0.92	0.31 0.53 0.92	0.30 0.52 0.91	0.30 0.51 0.90	0.29 0.50 0.87	0.28 0.48 0.84	0.27 0.46 0.81	0.25 0.44 0.78	0.24 0.42 0.73	0.23 0.40 0.69	0.21 0.37 0.64	0.19 0.34 0.59	0.18 0.32 0.54	0.17 0.29 0.50	0.15 0.26 0.45	0.14 0.24 0.40	0.12 0.21 0.37	0.11 0.19 0.33	0.10 0.17 0.30	0.09 0.16 0.27	0.08 0.14 0.24

NOTE—This table is based on the following efficiencies: 100-watt, 1.20 w.p.c.; 150-watt, 1.20 w.p.c.; 250-watt, 1.15 w.p.c.

TABLE No. 7

Showing Illumination in Foot-Candles from "MAZDA" 25 40 and 60-Watt 100-125 Volt, Bowl-Frosted Lamps, equipped respectively with Holophane Focusing Clear High Efficiency Reflectors Nos. 106328, 106330, and 106350. Illumination corresponds to the 25-watt, middle number to the 40-watt, and bottom number to the 60-watt Units.)

Horizontal distance of point investigated in feet from point directly beneath Unit.

Height of Unit in feet above plane to be illuminated.

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
4	4.13	3.46	1.68	0.80	0.39	0.20	0.11	0.07	0.04	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	....	....	....	....
	7.04	5.83	2.15	1.30	0.63	0.36	0.22	0.13	0.08	0.06	0.04	0.04	0.03	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01
	10.94	8.80	4.82	2.49	1.37	0.64	0.37	0.20	0.14	0.09	0.07	0.06	0.04	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01
5	2.64	2.45	1.45	0.80	0.45	0.25	0.15	0.08	0.05	0.04	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	....	....
	4.50	4.11	2.51	1.33	0.75	0.40	0.25	0.17	0.12	0.07	0.05	0.04	0.03	0.03	0.02	0.02	0.02	0.01	0.01	0.01	0.01
	7.00	6.34	3.98	2.41	1.25	0.65	0.40	0.30	0.21	0.13	0.09	0.07	0.06	0.04	0.03	0.03	0.02	0.01	0.01	0.01	0.01
6	1.86	1.76	1.23	0.75	0.45	0.28	0.18	0.11	0.07	0.05	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	....
	3.13	2.98	2.28	1.28	0.71	0.50	0.28	0.20	0.13	0.09	0.07	0.05	0.04	0.03	0.02	0.02	0.02	0.01	0.01	0.01	0.01
	4.86	4.64	3.39	2.15	1.49	0.94	0.55	0.35	0.22	0.15	0.11	0.08	0.06	0.05	0.04	0.03	0.03	0.02	0.02	0.01	0.01
7	1.35	1.31	1.03	0.69	0.44	0.29	0.19	0.13	0.09	0.06	0.04	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	....
	2.29	2.23	1.74	1.14	0.66	0.45	0.31	0.21	0.15	0.11	0.09	0.06	0.05	0.04	0.03	0.02	0.02	0.02	0.01	0.01	0.01
	3.57	3.48	2.76	1.96	1.24	0.82	0.49	0.37	0.25	0.17	0.14	0.10	0.07	0.06	0.04	0.03	0.03	0.02	0.02	0.02	0.01
8	1.01	1.01	0.87	0.62	0.43	0.29	0.20	0.14	0.10	0.07	0.05	0.04	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01
	1.75	1.70	1.53	1.00	0.62	0.42	0.32	0.24	0.17	0.12	0.09	0.07	0.05	0.04	0.03	0.03	0.02	0.02	0.02	0.01	0.01
	2.73	2.67	2.27	1.65	1.21	0.84	0.63	0.45	0.32	0.23	0.16	0.12	0.09	0.07	0.05	0.05	0.04	0.03	0.03	0.02	0.02
9	0.81	0.80	0.73	0.55	0.40	0.28	0.20	0.15	0.11	0.08	0.06	0.04	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01
	1.38	1.35	1.22	0.90	0.61	0.41	0.30	0.23	0.17	0.13	0.09	0.07	0.05	0.04	0.03	0.03	0.02	0.02	0.02	0.02	0.01
	2.16	2.11	1.90	1.48	1.10	0.82	0.60	0.46	0.32	0.25	0.18	0.14	0.10	0.08	0.06	0.05	0.04	0.03	0.03	0.02	0.02
10	0.66	0.65	0.61	0.49	0.36	0.27	0.20	0.15	0.11	0.09	0.06	0.05	0.04	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01
	1.12	1.10	1.04	0.83	0.59	0.40	0.30	0.23	0.17	0.14	0.11	0.08	0.06	0.05	0.04	0.03	0.02	0.02	0.02	0.02	0.01
	1.75	1.72	1.63	1.29	1.00	0.77	0.59	0.46	0.34	0.26	0.20	0.15	0.11	0.09	0.07	0.06	0.04	0.04	0.03	0.03	0.02
12	0.55	0.54	0.51	0.43	0.34	0.26	0.19	0.15	0.11	0.09	0.07	0.05	0.04	0.03	0.02	0.02	0.02	0.01	0.01	0.01	0.01
	0.93	0.91	0.86	0.75	0.55	0.38	0.28	0.23	0.18	0.14	0.11	0.09	0.07	0.06	0.04	0.03	0.03	0.02	0.02	0.02	0.01
	1.45	1.42	1.34	1.15	0.91	0.70	0.56	0.45	0.35	0.28	0.22	0.17	0.13	0.10	0.08	0.06	0.05	0.04	0.04	0.03	0.02
	0.46	0.45	0.44	0.38	0.31	0.24	0.19	0.15	0.11	0.09	0.07	0.06	0.04	0.03	0.03	0.02	0.02	0.01	0.01	0.01	0.01
	0.78	0.77	0.74	0.66	0.51	0.37	0.27	0.22	0.17	0.14	0.11	0.09	0.07	0.06	0.05	0.04	0.03	0.03	0.02	0.02	0.02
	1.22	1.20	1.16	1.01	0.81	0.65	0.54	0.45	0.34	0.28	0.22	0.17	0.14	0.11	0.09	0.07	0.05	0.05	0.04	0.04	0.03
	0.39	0.39	0.38	0.36	0.28	0.23	0.19	0.14	0.11	0.09	0.07	0.06	0.05	0.04	0.03	0.02	0.02	0.02	0.01	0.01	0.01
	0.66	0.66	0.64	0.59	0.49	0.37	0.27	0.21	0.17	0.14	0.11	0.09	0.07	0.06	0.05	0.04	0.04	0.03	0.02	0.02	0.02
	1.04	1.02	1.00	0.90	0.76	0.63	0.50	0.41	0.34	0.27	0.22	0.18	0.14	0.12	0.10	0.08	0.07	0.05	0.04	0.04	0.03
14	0.34	0.34	0.33	0.31	0.26	0.21	0.17	0.14	0.11	0.09	0.07	0.06	0.05	0.04	0.03	0.03	0.02	0.02	0.01	0.01	0.01
	0.57	0.57	0.56	0.53	0.44	0.34	0.27	0.20	0.16	0.14	0.11	0.10	0.07	0.06	0.05	0.05	0.04	0.03	0.02	0.02	0.02
	0.89	0.88	0.87	0.81	0.69	0.56	0.48	0.39	0.33	0.27	0.22	0.19	0.15	0.12	0.10	0.08	0.07	0.06	0.05	0.04	0.04
	0.29	0.29	0.28	0.27	0.24	0.19	0.17	0.13	0.11	0.09	0.07	0.06	0.05	0.04	0.03	0.03	0.02	0.02	0.02	0.01	0.01
	0.50	0.49	0.48	0.46	0.40	0.33	0.26	0.20	0.16	0.13	0.11	0.09	0.07	0.06	0.05	0.04	0.03	0.03	0.02	0.02	0.02
	0.78	0.77	0.75	0.67	0.62	0.62	0.44	0.38	0.32	0.27	0.22	0.19	0.15	0.13	0.11	0.09	0.07	0.06	0.05	0.05	0.04
16	0.26	0.26	0.25	0.24	0.22	0.18	0.16	0.12	0.10	0.09	0.07	0.06	0.05	0.04	0.04	0.03	0.02	0.02	0.02	0.01	0.01
	0.44	0.44	0.43	0.41	0.37	0.30	0.25	0.19	0.16	0.13	0.11	0.09	0.08	0.07	0.06	0.05	0.04	0.04	0.03	0.03	0.02
	0.68	0.68	0.67	0.63	0.57	0.48	0.41	0.35	0.30	0.25	0.22	0.19	0.16	0.13	0.11	0.10	0.08	0.06	0.05	0.05	0.04
17	0.23	0.23	0.22	0.22	0.20	0.17	0.15	0.13	0.10	0.09	0.07	0.06	0.05	0.04	0.04	0.03	0.03	0.02	0.02	0.02	0.01
	0.39	0.38	0.38	0.37	0.34	0.29	0.23	0.19	0.16	0.13	0.11	0.09	0.08	0.07	0.06	0.05	0.04	0.04	0.03	0.03	0.02
	0.60	0.60	0.59	0.58	0.53	0.45	0.38	0.33	0.29	0.25	0.21	0.18	0.16	0.13	0.11	0.10	0.09	0.07	0.06	0.05	0.04
18	0.20	0.20	0.20	0.19	0.18	0.16	0.14	0.12	0.10	0.08	0.07	0.06	0.05	0.04	0.04	0.03	0.03	0.02	0.02	0.02	0.01
	0.35	0.35	0.34	0.33	0.30	0.26	0.23	0.18	0.15	0.12	0.11	0.09	0.08	0.07	0.06	0.05	0.04	0.04	0.03	0.03	0.03
	0.54	0.54	0.53	0.51	0.47	0.42	0.36	0.31	0.27	0.24	0.20	0.18	0.15	0.13	0.12	0.10	0.09	0.08	0.07	0.05	0.04
19	0.19	0.19	0.18	0.18	0.17	0.15	0.13	0.11	0.10	0.08	0.07	0.06	0.05	0.04	0.04	0.03	0.03	0.02	0.02	0.02	0.02
	0.31	0.31	0.31	0.30	0.28	0.25	0.21	0.17	0.15	0.12	0.10	0.09	0.08	0.07	0.06	0.05	0.04	0.04	0.03	0.03	0.03
	0.48	0.48	0.48	0.47	0.44	0.39	0.34	0.29	0.25	0.22	0.20	0.17	0.15	0.13	0.11	0.09	0.08	0.08	0.07	0.06	0.04
20	0.17	0.17	0.16	0.16	0.16	0.14	0.12	0.11	0.09	0.08	0.07	0.06	0.06	0.04	0.04	0.03	0.02	0.02	0.02	0.02	0.02
	0.28	0.28	0.28	0.27	0.26	0.24	0.21	0.17	0.15	0.12	0.10	0.09	0.07	0.06	0.06	0.05	0.04	0.04	0.03	0.03	0.03
	0.44	0.44	0.43	0.42	0.41	0.36	0.32	0.28	0.24	0.21	0.19	0.17	0.15	0.13	0.11	0.09	0.09	0.08	0.07	0.06	0.05

NOTE—This table is based on the following efficiencies: 25-watt, 1 33 w.p.c.; 40-watt 1 25 w.p.c.; 60-watt, 1.20 w.p.c.

TABLE No. 8

Showing Illumination in Foot-Candles from "MAZDA" 100, 150, and 250-Watt, 100-125 Volt, Bowl-Frosted Lamps, equipped respectively with Holophane Focusing Clear High Efficiency Reflectors Nos. 106380, 106385, and 106390. (Top number in each space corresponds to the 100-watt, middle number to the 150-watt, and bottom number to the 250-watt Unit.)

Horizontal distance of point investigated in feet from point directly beneath Unit. (Rows: Height of Unit in feet above plane to be illuminated.)

Height	0	1	2	3	4	5	6	7	8	9	10
4	18.20 26.92 46.10	16.41 22.66 40.58	7.00 11.71 20.85	3.72 5.82 9.92	1.74 2.98 5.29	0.91 1.65 2.87	0.50 0.96 1.71	0.27 0.59 1.07	0.19 0.39 0.70	0.13 0.28 0.47	0.09 0.19 0.34
5	11.68 17.24 29.48	10.72 16.12 27.80	6.16 10.25 18.36	3.65 5.60 9.74	2.05 3.24 5.60	1.16 1.91 3.38	0.65 1.19 2.07	0.39 0.75 1.33	0.23 0.50 0.90	0.16 0.35 0.62	0.12 0.25 0.46
6	8.10 11.97 20.48	7.73 11.62 20.19	5.13 8.66 15.15	3.29 5.20 9.26	2.08 3.24 6.54	1.37 2.07 3.53	0.80 1.33 2.34	0.49 0.88 1.53	0.32 0.61 1.07	0.17 0.43 0.76	0.13 0.31 0.55
7	5.96 8.80 15.04	5.77 8.64 14.98	4.57 7.18 12.35	2.90 4.77 8.56	1.91 3.11 5.36	1.29 2.08 3.56	0.90 1.42 2.45	0.62 0.93 0.72	0.42 0.70 1.19	0.26 0.60 0.87	0.17 0.37 0.65
8	4.55 6.74 11.51	4.45 6.66 11.55	3.78 5.76 10.15	2.52 4.31 7.67	1.75 2.83 5.21	1.28 2.05 2.48	0.92 1.45 2.48	0.70 1.04 1.80	0.49 0.75 1.32	0.33 0.55 0.96	0.22 0.41 0.72
9	3.60 5.32 9.10	3.52 5.29 9.15	3.12 4.81 8.40	2.76 3.80 6.74	1.61 2.77 4.96	1.21 1.86 3.46	0.89 1.44 2.46	0.69 1.06 1.82	0.51 0.79 1.38	0.38 0.59 1.05	0.28 0.45 0.80
10	2.92 4.31 7.37	2.86 4.29 7.40	2.72 4.04 6.98	2.06 3.31 5.90	1.51 2.56 4.59	1.10 1.88 3.34	0.87 1.40 2.44	0.68 1.06 1.80	0.51 0.81 1.40	0.41 0.63 1.08	0.31 0.48 0.86
11	2.41 3.56 6.09	2.37 3.56 6.13	2.26 3.40 5.90	1.90 2.92 5.15	1.41 2.35 4.18	1.03 1.79 3.18	0.51 1.36 2.39	0.64 1.05 1.79	0.52 0.81 1.39	0.42 0.64 1.10	0.34 0.51 0.87
12	2.03 2.99 5.12	2.00 2.99 5.15	1.93 2.90 5.02	1.68 2.56 4.61	1.30 2.12 3.79	0.97 1.69 3.02	0.77 1.30 2.32	0.64 1.03 1.77	0.50 0.81 1.38	0.41 0.65 1.10	0.33 0.52 0.88
13	1.72 2.66 4.36	1.71 2.55 4.40	1.66 2.48 4.30	1.60 2.26 3.94	1.22 1.93 3.43	0.92 1.58 2.84	0.73 1.27 2.26	0.68 0.99 1.74	0.49 0.80 1.36	0.40 0.64 1.10	0.33 0.52 0.90
14	1.49 2.20 3.76	1.48 2.20 3.79	1.44 2.16 3.74	1.34 2.02 3.50	1.11 1.75 3.14	0.87 1.47 2.63	0.70 1.19 2.14	0.56 0.96 1.70	0.47 0.78 1.34	0.39 0.63 1.09	0.32 0.52 0.89
15	1.30 1.92 3.27	1.29 1.92 3.31	1.26 1.89 3.28	1.21 1.79 3.10	1.04 1.59 2.80	0.80 1.37 2.43	0.67 1.13 2.04	0.54 0.92 1.65	0.46 0.76 1.32	0.39 0.62 1.08	0.32 0.52 0.89
16	1.14 1.68 2.88	1.13 1.68 2.80	1.11 1.66 2.69	1.06 1.60 2.77	0.96 1.44 2.54	0.75 1.26 2.24	0.63 1.08 1.92	0.61 0.89 1.69	0.43 0.73 1.30	0.37 0.61 1.07	0.32 0.51 0.88
17	1.01 1.49 2.65	1.00 1.49 2.56	0.99 1.48 2.56	0.86 1.43 2.48	0.87 1.31 2.30	0.71 1.17 2.07	0.59 1.01 1.80	0.49 0.86 1.63	0.42 0.71 1.25	0.36 0.60 1.05	0.31 0.50 0.88
18	0.90 1.33 2.27	0.90 1.33 2.28	0.88 1.33 2.29	0.86 1.29 2.23	0.78 1.20 2.10	0.67 1.07 1.80	0.56 0.95 1.69	0.47 0.82 1.47	0.40 0.69 1.24	0.34 0.68 1.03	0.30 0.49 0.87
19	0.81 1.19 2.04	0.81 1.19 2.05	0.80 1.19 2.06	0.78 1.16 2.01	0.74 1.10 1.92	0.64 1.00 1.76	0.53 0.89 1.58	0.45 0.78 1.39	0.39 0.67 1.19	0.33 0.56 1.01	0.29 0.48 0.86
20	0.73 1.08 1.84	0.73 1.08 1.86	0.72 1.07 1.86	0.70 1.06 1.82	0.68 1.01 1.75	0.61 0.92 1.62	0.51 0.83 1.47	0.43 0.74 1.31	0.38 0.64 1.16	0.33 0.55 0.99	0.28 0.47 0.82

Height	11	12	13	14	15	16	17	18	19	20
4	0.08 0.14 0.26	0.06 0.11 0.19	0.05 0.08 0.15	0.04 0.06 0.12	0.04 0.05 0.09	0.03 0.04 0.08	0.02 0.04 0.06	0.02 0.03 0.05	0.01 0.03 0.05	0.01 0.02 0.04
5	0.09 0.18 0.32	0.07 0.14 0.25	0.06 0.11 0.19	0.04 0.09 0.16	0.04 0.07 0.12	0.03 0.06 0.10	0.03 0.05 0.08	0.03 0.04 0.07	0.02 0.03 0.06	0.02 0.03 0.05
6	0.11 0.23 0.40	0.09 0.17 0.31	0.06 0.14 0.24	0.05 0.11 0.19	0.04 0.08 0.15	0.04 0.07 0.12	0.03 0.06 0.10	0.03 0.05 0.08	0.02 0.04 0.07	0.02 0.03 0.06
7	0.13 0.27 0.48	0.10 0.21 0.36	0.08 0.16 0.28	0.06 0.13 0.23	0.05 0.10 0.18	0.04 0.08 0.15	0.04 0.07 0.12	0.03 0.06 0.10	0.03 0.05 0.08	0.02 0.04 0.07
8	0.17 0.31 0.55	0.12 0.24 0.43	0.09 0.19 0.35	0.07 0.15 0.27	0.06 0.12 0.21	0.05 0.10 0.18	0.04 0.08 0.14	0.04 0.07 0.12	0.03 0.06 0.10	0.02 0.05 0.08
9	0.20 0.35 0.60	0.14 0.27 0.48	0.11 0.21 0.38	0.08 0.17 0.30	0.06 0.14 0.26	0.06 0.11 0.20	0.04 0.09 0.16	0.04 0.08 0.14	0.03 0.07 0.12	0.03 0.06 0.10
10	0.23 0.38 0.66	0.17 0.30 0.52	0.13 0.24 0.41	0.10 0.19 0.33	0.08 0.15 0.27	0.07 0.13 0.23	0.06 0.10 0.18	0.04 0.08 0.16	0.03 0.07 0.13	0.02 0.06 0.11
11	0.26 0.39 0.70	0.19 0.32 0.66	0.16 0.26 0.45	0.12 0.21 0.36	0.09 0.17 0.30	0.07 0.14 0.25	0.06 0.12 0.21	0.05 0.10 0.18	0.04 0.08 0.14	0.03 0.08 0.12
12	0.26 0.41 0.72	0.22 0.33 0.59	0.18 0.27 0.48	0.13 0.22 0.38	0.10 0.18 0.32	0.08 0.15 0.27	0.07 0.13 0.23	0.06 0.11 0.19	0.05 0.09 0.16	0.04 0.08 0.14
13	0.28 0.42 0.73	0.22 0.35 0.60	0.18 0.28 0.50	0.15 0.23 0.41	0.12 0.20 0.33	0.10 0.16 0.28	0.07 0.13 0.24	0.06 0.12 0.20	0.06 0.10 0.17	0.04 0.08 0.15
14	0.28 0.43 0.73	0.23 0.35 0.61	0.19 0.29 0.51	0.16 0.24 0.43	0.13 0.21 0.36	0.10 0.18 0.30	0.08 0.16 0.26	0.06 0.12 0.22	0.06 0.11 0.19	0.05 0.09 0.16
15	0.28 0.43 0.74	0.23 0.36 0.62	0.20 0.30 0.52	0.17 0.25 0.44	0.14 0.21 0.38	0.11 0.18 0.32	0.09 0.15 0.27	0.07 0.13 0.23	0.06 0.11 0.20	0.06 0.10 0.17
16	0.27 0.43 0.74	0.22 0.26 0.62	0.20 0.31 0.53	0.17 0.26 0.45	0.14 0.22 0.39	0.12 0.18 0.33	0.10 0.16 0.28	0.08 0.14 0.24	0.07 0.12 0.21	0.06 0.10 0.18
17	0.26 0.42 0.73	0.23 0.36 0.62	0.18 0.31 0.52	0.17 0.26 0.46	0.16 0.23 0.39	0.13 0.19 0.34	0.11 0.16 0.29	0.09 0.14 0.25	0.07 0.12 0.22	0.06 0.11 0.19
18	0.26 0.42 0.72	0.23 0.26 0.62	0.18 0.31 0.53	0.17 0.27 0.46	0.16 0.23 0.39	0.13 0.20 0.34	0.12 0.17 0.30	0.10 0.15 0.26	0.08 0.13 0.23	0.07 0.11 0.20
19	0.26 0.41 0.72	0.23 0.35 0.61	0.19 0.30 0.53	0.17 0.27 0.46	0.15 0.23 0.40	0.13 0.20 0.35	0.11 0.18 0.31	0.10 0.15 0.27	0.09 0.13 0.23	0.07 0.11 0.20
20	0.25 0.40 0.71	0.22 0.35 0.61	0.19 0.30 0.52	0.17 0.26 0.45	0.15 0.23 0.40	0.13 0.20 0.35	0.11 0.18 0.21	0.10 0.16 0.27	0.09 0.14 0.24	0.08 0.12 0.21

NOTE—This table is based on the following efficiencies: 100-watt, 1.20 w.p.c.; 150-watt, 1.20 w.p.c.; 250-watt, 1.15 w.p.c.

TABLE No. 9

Reflection Co-efficients of Walls and Ceilings.

Kind	Color	Coefficient of Reflection-K	$\frac{1}{1-K}$
Plain ceiling	Faint green	.53	2.13
	Light yellow	.49	1.96
	Faint pink	.43	1.75
	Pale bluish white	.31	1.45
	Light gray green	.23	1.30
Crepe	Medium green	.19	1.23
	Medium red	.08	1.09
	Deep green	.06	1.06
Cartridge	Medium light buff	.44	1.79
	Light blue	.20	1.25
	Pale pink	.19	1.23
	Light green	.18	1.22
Striped	Deep cream silvery	.57	2.32
("Two-toned")	Light strawberry pink	.43	1.75
	Light green	.26	1.35
	Medium red	.08	1.09
Miscellaneous	Light gray	.38	1.61
	Light green and gold (minute figuring, much gold)	.28	1.39

TABLE No. 10

Average Percentage of Reflection from Walls and Ceilings.

Ceiling	Walls	Increase over calculated
Very dark	Very dark	0%
Medium	Very dark	15%
Medium	Medium	40%
Very light	Very dark	30%
Very light	Medium	55%
Very light	Very light	80%

TABLE No. 11—Spacing of Units for Uniform Illumination

Clear Holophane Reflectors, Type	Height above Plane to be lighted
Extensive	1/2 D
Intensive	4/5 D
Focusing	4/3 D

D = Distance between units = Side of square, when units are placed in squares = Average side of rectangle, when units are placed in rectangles.

TABLE No. 12

Current Taken by Incandescent Lamps

	Mazda								Tantalum		Gem		Carbon	
1. Watts per lamp	25	40	60	100	150	250	400	500	40	80	50	100	50	100
2. Candle-power at rated efficiency	19.1	32.5	50.8	84.7	127.0	222.0	354.0	442.0	20	40	20.0	40.7	16.8	33.6
3. Amperes per lamp at 110 volts	.23	.36	.55	.91	1.36	2.27	3.64	4.55	.36	.73	.46	.91	.46	.91
4. Permissible number of lamps per cut-out	26	17	11	6	4	2	1	1	16	8	13	6	13	6
5. Candle-power per cut-out	495	550	560	510	510	445	355	440	320	320	260	245	220	200

TABLE No. 13

Carrying Capacity of Wire as Established by the National Board of Fire Underwriters

B & S Gauge	Circular Mils	Rubber Covered Wire. Amperes	Weather Proof Wire. Amperes
18	1,624	3	5
16	2,583	6	8
14	4,107	12	16
12	6,530	17	23
10	10,380	24	32
8	16,510	33	46
6	26,250	46	65
5	33,100	54	77
4	41,740	65	92
3	52,630	76	110
2	66,370	90	131
1	83,690	107	156
0	105,500	127	185
00	133,100	150	220
000	167,800	177	262
0000	211,600	210	312

The question of drop is not considered in the above table.

No wire smaller than No. 14 is used except for fixture work and flexible cord.

TABLE No. 14

Table Showing Size of Wire for Drop of One Volt

Size	Distance in Feet to Center of Distribution																
No. of Wire B. & S.	20′	25′	30′	35′	40′	45′	50′	60′	70′	80′	90′	100′	120′	140′	160′	180′	200′
14	9.5	7.60	6.34	5.42	4.75	4.22	3.80	3.17	2.62	2.37	2.11	1.90	1 58	1 35	1.18	1.05	1.95
12	15.1	12.08	10.06	8.64	7.55	6.61	6.04	5.03	4.31	3.78	3.36	3 02	2.51	2.15	1.88	1.68	1.51
10	24.0	19.20	16.00	13.60	12.00	10.66	9.60	8.00	6.86	6.00	5.33	4.80	4.00	3.43	3.00	2.66	2.40
8	33	30.55	25.45	21.80	19.10	16.90	15.28	12.72	10.90	9.55	8.49	7.64	6.36	5.45	4.77	4.24	3.82
6	46	46	40.4	34.60	30.30	26.95	24.25	20.20	17.30	15.15	13.48	12.12	10.10	8.66	7.58	6 24	6.06
5	54	54	51.0	43.75	38.25	34.00	30.60	25.50	21.85	19.12	17.00	15.30	12.75	10.92	9.56	8.50	7.65
4	65	65	64.5	55.15	48.25	42.90	38.60	32.17	27.58	24.13	21.44	19.30	16.08	13.79	12.06	10.72	9.65
3	76	76	76	69.6	60.9	54.1	48.7	40.60	34.80	30.45	27.05	24.35	20.30	17.40	15.22	13.52	12.17
2	90	90	90	87.6	76.6	68.1	61.4	51.1	43.8	38.30	34.05	30.66	25.55	21.90	19.15	17.02	15.33
1	107	107	107	107	95.5	84.9	76.4	69.5	54.6	47.75	42.45	38 20	31.85	27.30	23.86	21.22	19.10
0	127	127	127	127	122.0	108.4	97.6	81.3	69.7	61.00	54.20	48.80	40.65	34 85	30.50	27.10	24.40
00	150	150	150	150	150	136.6	123.0	102.5	87.9	76.80	68.30	61.50	51.25	43.90	38.40	34 15	30.75
000	177	177	177	177	177	172.2	155.0	129 2	110.7	96.9	86.1	77.5	64.6	55.35	48.45	43.05	38.75
0000	210	210	210	210	210	210	195.6	163 0	139.6	122.3	109.6	97.8	81.5	69.8	61.15	54 30	48.90

Formula used $A = \frac{I\ D\ 21.62}{V}$

Currents found under the broken line are the maximum allowable by National Board of Underwriters for the size specified (Rubber Covered Wire). The drop for these currents is less than one volt. This table is for continuous current only. If A. C. single phase, for lighting load multiply values given in the table by .9, for lighting and power load multiply the values given in the table by .82. If A. C. two phase (4 wire) or three phase (3 wire), for lighting load multiply values given in the table by 1.8, for lighting and power load, multiply the values given in the table by 1.64.

TABLE No. 15

Showing Total Cost of Producing Light with "MAZDA" Lamps at High, Medium and Low Efficiency

Nominal Watts	25			40			60			100		
Efficiency Step	High	Med.	Low	High	Med.	Low	High	Med.	Low	High	Med.	Low
Watts per Candle	1.31	1.37	1.43	1.23	1.28	1.33	1 18	1.23	1.28	1.18	1.23	1.28
Actual Watts	25.0	24.2	23.4	40.0	38.9	37.8	60.0	58.2	56.5	100.0	97.0	94.2
Candle-Power	19 1	17 7	16.4	32.5	30.4	28.5	50.8	47.3	44.2	84.7	78 9	73.6
Total Lumens	187	173	160	319	298	277	498	464	433	830	773	722
Lumens per Watt	7.48	7.16	6.85	7.97	7 67	7.37	8.30	7 97	7.67	8.30	7.97	7.67
Hours Life	1000	1300	1700	1000	1300	1700	1000	1300	1700	1000	1300	1700
List Price—Clear	$0.65	$0 65	$0 65	$0 70	$0 70	$0 70	$1 00	$1.00	$1.00	$1.35	$1.35	$1.35
Renewals per 1000 hr.	.65	.50	38	70	54	41	1 00	77	59	1.35	1.04	.79
Variable Cost of Power	*Combined Cost of Power and Lamp Renewals per 100,000 Lumen-Hours in Dollars											
1c per Kw-hr	$0 48	$0.43	$0.38	$0.34	$0.31	$0.28	$0.33	$0 29	$0.27	$0.28	$0 26	$0.24
2c " " "	62	57	53	47	44	.42	.45	42	40	.40	.39	.37
3c " " "	75	71	68	.59	.57	.56	57	.54	.53	52	51	.50
4c " " "	.88	85	82	72	71	69	69	67	66	64	64	.63
5c " " "	1.02	99	.97	84	84	83	81	79	79	76	76	.76
6c " " "	1.15	1 13	1 11	97	97	96	93	92	.92	.88	.89	90
8c " " "	1 42	1 41	1 41	1 22	1.23	1 24	1 17	1 17	1 18	1.12	1.14	1.16
10c " " "	1 69	1 69	1 70	1 47	1.49	1 51	1 41	1 42	1 44	1 36	1.40	1.42
12c " " "	1 96	1.97	1 99	1 72	1.75	1 78	1 65	1.67	1 70	1 60	1.65	1.68
*For each one cent difference in cost of lamp add or subtract	0.0054	0045	0037	0031	.0026	0021	.0020	.0017	0014	.0012	0010	.0008

100,000 Lumen-Hours from a "Mazda" Lamp is equal to 10,200 Mean Horizontal Candle-Hours.

TABLE No. 15—Continued.

Nominal Watts	150			250			400			500		
Efficiency Step	High	Med.	Low	High	Med.	Low	High	Med.	Low	High	Med.	Low
Watts per Candle	1.18	1.23	1.28	1.13	1.18	1.23	1.13	1.18	1.23	1.13	1.18	1.23
Actual Watts	150.0	145.5	141.2	250.0	242.0	235.0	400.0	387.0	376.0	500.0	484.0	470.0
Candle-Power	127.0	118.3	110.4	222.0	204.2	191.0	354.0	328.0	306.0	442.0	410.0	382.0
Total Lumens	1245	1160	1083	2168	2009	1873	3470	3215	3000	4335	4020	3745
Lumens per Watt	8.30	7.97	7.67	8.67	8.30	7.97	8.67	8.30	7.97	8.67	8.30	7.97
Hours Life	1000	1300	1700	1000	1300	1700	1000	1300	1700	1000	1300	1700
List Price—Clear	$2.00	$2.00	$2.00	$2.75	$2.75	$2.75	$5.00	$5.00	$5.00	$5.50	$5.50	$5.50
Renewals per 1000 hr.	2.00	1.54	1.18	2.75	2.12	1.62	5.00	3.85	2.94	5.50	4.23	3.24
Variable Cost of Power	*Combined Cost of Power and Lamp Renewals per 100,000 Lumen-Hours in Dollars											
1c per kw-hr.	$0.28	$0.26	$0.24	$0.24	$0.23	$0.21	$0.26	$0.24	$0.22	$0.24	$0.23	$0.21
2c " " "	.40	.38	.37	.36	.35	.34	.37	.36	.35	.36	.35	.34
3c " " "	.52	.51	.50	.47	.47	.47	.49	.48	.47	.47	.47	.46
4c " " "	.64	.63	.63	.59	.59	.59	.60	.60	.59	.59	.59	.59
5c " " "	.77	.76	.76	.70	.71	72	.72	.72	.72	.70	.71	.71
6c " " "	.89	.88	.89	.82	.83	.84	.83	.84	.85	.82	.83	.84
8c " " "	1.13	1.13	1.15	1.05	1.07	1.10	1.06	1.08	1.10	1.05	1.07	1.09
10c " " "	1.37	1.38	1.41	1.28	1.31	1.35	1.29	1.32	1.35	1.28	1.31	1.34
12c " " "	1.61	1.63	1.67	1.51	1.55	1.60	1.52	1.56	1.60	1.51	1.55	1.59
*For each one cent difference in cost of lamp add or subtract	0.0008	.0007	.0005	.0005	0004	.0003	.0003	.0002	.0002	0002	.0002	0002

100,000 Lumen-Hours from a "Mazda" Lamp is equal to 10,200 Mean Horizontal Candle-Hours.

TABLE No. 16

Showing Total Cost of Producing Light with Tantalum Lamps at High, Medium and Low Efficiency

Nominal Watts	25			40			50			80		
Efficiency Step	High	Med.	Low	High	Med.	Low	High	Med.	Low	High	Med.	Low
Watts per Candle	1.97	2.05	2.14	1.79	1.87	1.95	1.79	1.87	1.95	1.79	1.87	1.95
Actual Watts	25.0	24.2	23.5	40.0	38.8	37.6	50.0	48.5	47.0	80.0	77.6	75.2
Candle-Power	12.7	11.8	11.0	22.3	20.7	19.3	27.9	25.9	24.1	44.6	41.5	38.6
Total Lumens	126	117	109	221	206	191	277	257	239	443	412	383
Lumens per Watt	5.04	4.83	4.64	5.54	5.31	5.09	5.54	5.31	5.09	5.54	5.31	5.09
Hours Life (D. C.)	1000	1300	1700	800	1100	1500	800	1100	1500	600	800	1050
List Price—Clear	$0.50	$0.50	$0.50	$0.50	$0.50	$0.50	$0.50	$0.50	$0.50	$0.85	$0.85	$0.85
Renewals per 1000 hr.	.60	.38	.29	.63	.45	.33	.63	.45	.33	1.42	1.06	.81
Variable Cost of Power	*Combined Cost of Power and Lamp Renewals per 100,000 Lumen-Hours in Dollars.											
1c per Kw-hr.	$0.60	$0.54	$0.49	$0.46	$0.41	$0.37	$0.41	$0.37	$0.34	$0.50	$0.45	$0.41
2c " " "	.79	.74	.71	.64	.60	.57	.59	.55	.53	.68	.63	.60
3c " " "	.99	.95	.92	.83	.79	.77	.77	.74	.73	.86	.82	.80
4c " " "	1.19	1.16	1.13	1.01	.97	.96	95	.93	.93	1.04	1.01	1.00
5c " " "	1.39	1.36	1.35	1.19	1.16	1.16	1.13	1.12	1.12	1.22	1.20	1.19
6c " " "	1.59	1.57	1.56	1.37	1.35	1.36	1.31	1.31	1.32	1.40	1.39	1.39
8c " " "	1.98	1.98	1.99	1.73	1.73	1.75	1.67	1.69	1.71	1.76	1.77	1.78
10c " " "	2.38	2.39	2.43	2.09	2.10	2.14	2.03	2.06	2.11	2.12	2.14	2.18
12c " " "	2.79	2.81	2.86	2.45	2.49	2.54	2.39	2.44	2.50	2.49	2.52	2.57
*For each one cent difference in cost of lamp add or subtract	0.0079	.0066	.0054	.0057	.0044	.0035	.0045	.0035	.0028	.0038	.0030	.0025

100,000 Lumen-Hours from a Tantalum Lamp is equal to 10,100 Mean Horizontal Candle-Hours.

TABLE No. 17

Showing Total Cost of Producing Light with Gem Lamps at High, Medium and Low Efficiency

Nominal Watts	40			50			60			80			100		
Efficiency Step	High	Med.	Low	High	Med.	Low	High	Med.	Low	High	Med.	Low	High	Med.	Low
Watts per Candle	2.56	2.71	2.89	2.50	2.65	2 81	2.50	2 65	2.81	2 46	2.60	2.78	2 46	2.60	2.78
Actual Watts	40.0	38.7	37.3	50.0	48.4	46 7	60.0	58.0	56.0	80.0	77 4	74.6	100.0	96.7	93.2
Candle-Power	15.6	14.2	12.9	20.0	18.3	16 6	24.0	21 9	19.9	32.5	29.8	26.8	40.7	37.2	33.5
Total Lumens	162	148	135	207	189	172	249	227	206	337	308	278	419	384	346
Lumens per Watt	4.05	3.82	3.69	4.15	3.91	3.66	4 15	3 91	3 68	4.21	3.98	3.73	4.19	3.96	3.71
Hours Life	600	900	1300	700	1000	1500	700	1000	1500	700	1000	1500	650	950	1400
List Price—Clear	$0.21	$0.21	$0.21	$0.21	$0.21	$0.21	$0.21	$0.21	$0.21	$0.35	$0.35	$0 35	$0.35	$0.35	$0.35
Renewals per 1000 hr	35	23	16	30	21	.14	.30	21	14	50	35	23	54	.37	.25
Variable Cost of Power	*Combined Cost of Power and Renewals per 100,000 Lumen-Hours in Dollars														
1c per kw-hr.	$0.46	$0.42	$0 40	$0.39	$0.37	$0.35	$0.36	$0.35	$0.34	$0 39	$0.36	$0.35	$0.37	$0.35	$0.34
2c " " "	.71	.68	67	.63	.62	.62	60	60	.61	62	.62	.62	.61	.60	.61
3c " " "	96	.95	.95	.87	.88	.90	.85	.86	.88	80	87	.89	.84	.85	88
4c " " "	1.20	1 21	1.23	1.12	1.14	1.17	1.09	1 12	1.15	1.10	1.12	1.16	1.08	1.10	1.15
5c " " "	1.45	1.47	1.50	1.36	1.39	1.44	1.33	1.37	1.43	1 34	1.37	1.42	1.32	1.36	1.42
6c " " "	1.70	1.72	1.78	1.60	1.65	1.71	1.57	1.63	1.70	1.57	1.62	1 69	1.56	1.61	1.69
8c " " "	2.19	2.24	2.33	2.08	2.16	2.25	2.05	2 14	2.25	2.05	2.12	2.23	2.03	2.11	2.23
10c " " "	2.69	2 78	2.88	2.56	2.67	2.80	2.53	2.65	2.79	2 52	2.63	2.77	2.51	2 62	2 77
12c " " "	3.18	3.30	3.43	3 06	3 18	3.34	3.01	3.16	3 34	3.00	3-13	3-30	2 99	3-12	3.31
*For each one cent difference in price of lamp add or subtract	0.0103	.0075	0057	0069	0053	0039	0057	0044	.0032	.0042	.0032	0024	0037	.0027	0021

100,000 Lumen-Hours from a Gem Lamp is equal to 9.650 Mean Horizontal Candle-Hours

TABLE No. 18

Showing Total Cost of Producing Light with Carbon Lamps at High, Medium and Low Efficiency

Nominal Watts	25			30			50			60			100			120		
Efficiency Step	High	Med.	Low	High	Med.	Low	High	Med.	Low	High	Med.	Low	High	Med.	Low	High	Med.	Low
Watts per Candle	3.10	3.31	3.52	3.23	3.46	3.69	2 97	3.18	3.39	2.97	3 18	3 39	2 97	3.18	3 39	2.97	3 18	3.39
Actual Watts	25.0	24.1	23.2	30.0	28.9	27.8	50 0	48.2	46 4	60 0	57 8	55.7	100.0	96.4	92.9	120.0	115.8	111.4
Candle-Power	8.1	7.3	6.6	9.3	8.4	7 5	16 8	15.2	13.7	20.2	18 3	16.4	33.6	30.5	27 4	40.4	36.6	32.8
Total Lumens	83.6	75.4	68.2	96.4	87.0	77 7	174	158	142	208	190	170	349	316	284	419	379	340
Lumens per Watt	3 34	3.15	2 94	3.21	3.00	2.81	3 49	3.26	3 06	3 49	3 26	3 06	3 49	3 26	3 06	3.49	3.26	3.06
Hours Life	500	725	1050	1050	1500	2100	700	1000	1500	700	1000	1500	600	850	1350	600	850	1350
List Price—Clear	$0.20	$0.20	$0 20	$0 20	$0 20	$0 20	$0 20	$0.20	$0.20	$0 20	$0 20	$0 20	$0 30	$0.30	$0 30	$0 30	$0.30	$0.30
Renewals per 1000 hr.	.40	.28	19	.19	13	10	29	.20	15	29	20	13	.50	35	.22	50	.35	.22
Variable Cost of Power	*Combined Cost of Power and Lamp Renewals per 100,000 Lumen-Hours in Dollars																	
1c per kw-hr	$0.78	$0.69	$0.62	$0 51	$0.49	$0 48	$0 45	$0.43	$0 42	$0.43	$0 41	$0 41	$0 43	$0 42	$0.41	$0.41	$0.40	$0.39
2c " " "	1.08	1 01	96	.82	.82	84	74	74	.75	.71	71	.73	72	72	.73	69	70	72
3c " " "	1.38	1 33	1 30	1 13	1 15	1.20	1.03	1 04	1.07	1 00	1 02	1.06	1.00	1.03	1.06	98	1.01	1.05
4c " " "	1 68	1.64	1 63	1 44	1 48	1 55	1.31	1.35	1 40	1.29	1.32	1 39	1 29	1.33	1.39	1 27	1.32	1.38
5c " " "	1 97	1 96	1 97	1 75	1.81	1 91	1.60	1.65	1.73	1 58	1 63	1.72	1.58	1.64	1.71	1 55	1 62	1.70
6c " " "	2.27	2.28	2.31	2 07	2 15	2.27	1 89	1 96	2.05	1.87	1.93	2.04	1 86	1 94	2.04	1.84	1 93	2.03
8c " " "	2 87	2 92	2 99	2.69	2.81	2 99	2 46	2.57	2 71	2.44	2 54	2 70	2.44	2.55	2.70	2.41	2.54	2.69
10c " " "	3 47	3.56	3.67	3.31	3.48	3 70	3.04	3.18	8.36	3.02	3.15	3.38	3.01	8.16	3.35	2.98	3.15	3.34
*For each one cent difference in cost of lamp add or subtract	0.0239	.0183	.0140	.0079	.0077	.0061	.0082	0063	.0047	0069	.0053	.0039	.0048	.0037	.0026	0040	.0031	.0022

100,000 Lumen-Hours from a Carbon Lamp is equal to 9,650 Mean Horizontal Candle-Hours.

TABLE No. 19

Intrinsic Brilliancy of Light Sources	Candle-power per sq. in.
Moore tube	0.3 — 1.75
Frosted incandescent	2.0 — 5
Candle	3.0 — 4
Gas flame	3.0 — 8
Oil lamp	3.0 — 8
Cooper Hewitt lamp	17
Welsbach gas mantle	20.0 — 50
Acetylene	75.0 — 100
Enclosed A.C. arc	75.0 — 200
Enclosed D.C. arc	100.0 — 500
Incandescent Lamps—	
Carbon 3.5 watts per candle	375
Carbon 3.1 watts per candle	480
Metallized carbon 2.5 watts per candle	625
Tantalum 2.0 watts per candle	750
"MAZDA" 1.25 watts per candle	875
"MAZDA" 1.15 watts per candle	1000
Nernst 1:5 watts per candle	2200
Sun on horizon	2000
Flaming arc	5000
Open arc lamp	10,000–50,000
Open arc crater	200,000
Sun 30° above horizon	500,000
Sun at zenith	600,000

TABLE No. 20

	"MAZDA"						Tantalum	Gem	Carbon 3.1 w.p.c.
Watts per Lamp	25	40	60	100	150	250			
Effective Lumens per Lamp	95	160	250	420	630	1090			
Lumens per Watt	3.8	4.0	4.2	4.2	4.2	4.3	2.5	1.8	1.5

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